PRISMA Promoting Rural Income through Support for Markets in Agriculture

Kementerian PPN/ Bappenas

Australian Aid

Livelihood Profile

Mango Farmers in North Lombok, West Nusa Tenggara

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Contents

Livelihood Profile of Mango Farmers in Lombok, West Nusa Tenggara

1. Purpose of Study

The purpose of this study is to build a socio-economic profile of PRISMA's target group for each subsector to better understand their livelihood position. It also aims to understand the context of their poverty and vulnerability so as to determine how they behave and the drivers behind this behaviour. The goal of this study is to understand Mango farmers in Northern Lombok, and their decisions related to cultivating Mango. Therefore, to understand PRISMA's target group and how and why Mango farmers in Lombok make certain decisions, the main research questions of this study are:

I. What is the socio-economic position of Mango farmers?
II. What are common livelihood patterns and strategies of mango farmers in North Lombok?
III. What is the importance of mango for farmers' livelihoods?
IV. What are determinants and mechanisms of decisions related to mango?

This study uses both qualitative research methods through focus group discussions (FGDs) and interviews, and a quantitative survey of 50 households. The UK Department for International Development (DFID) Sustainable Livelihood approach and the Progress out of Poverty Index (PPI) were also employed to guide the research methodology in finalising this report.

2. Audience

The target beneficiaries of this study are:

I. PRISMA Intervention teams – to gain more insight into the behaviours of their target groups in order to design smarter interventions and/or make revisions as might be required. For example adjusting targeting or intervention logic
II. PRISMA steering review panel – to use the results of the study to guide the technical thinking of the PRISMA internal teams
III. Department of Foreign Affairs and Trade (DFAT) – to provide a tangible picture of the target group PRISMA teams work with, the characteristics of communities at risk of poverty and what they may look like
IV. Ministry of National Development Planning – to understand PRIMA's work in specific agricultural subsectors and gain an overall picture of its target group and behaviours

The results from this study may be used to compile other case studies and communication materials showcasing PRISMA's work.

3. Introduction and methodology

Indonesia is the fourth largest mango producer globally, with approximately 2.4 million tonnes of mangoes in 2014, up from 2.2 million tonnes in 2013. Mango is the largest fruit crop in Indonesia, with production increasing at an annual rate of 4%. The main variety is Arumanis (also called Gadung in some areas), which is very popular among domestic consumers. Mango production in Indonesia is highly seasonal, with most mangoes harvested between October and December. Since off-season prices can be nearly four times as high, some mango producing areas, particularly in West Java and Central Java, are placing increasing emphasis on early crop flowering to encourage Mango production off season. Although Indonesia enjoys unique competitive advantages in Asian markets on account of its geographical location, the timing of its main mango harvest, and very low mango prices during its main season, it has a very marginal presence in international trade and nearly all of its production is consumed domestically.

West Nusa Tenggara (NTB) ranks the fifth as the largest mango producing province in Indonesia with approximate production 110,000 tonnes in 2014. This study focuses on farmers with mango trees in the North Lombok Regency, one of the main areas of intervention in the PRISMA Mango NTB sub-sector.

Mango farming in NTB in general is characterised by small farm sizes, with most smallholder farmers managing their own trees instead of renting them out. Additionally, there are some farmers renting productive land with mango trees where they also grow other crops, such as maize, chilli, etc. Where smallholder farmers grow their own mangoes, they tend to be passive in the management of their trees, expending minimal effort and resources. There is no off-season production in NTB, and the use of crop manipulation technology has not yet spread in NTB. The tebasan selling system[1] is prevalent, and the majority of mangoes are channelled to Java, Bali, and other major islands as well, where they are consumed primarily fresh.

3.1. Intervention selection: Mango early flowering technologies for the off season

Despite high market prices for mangoes harvested during the off season from May to September, most farmers in NTB are only producing mangoes during the peak season (October to December) when prices are a fraction of off-season prices. There is the prospect of shifting 50% of total production to an earlier harvest time to enable farmers to get a better price during off-season months. There is also scope for growth in exports and processed mangoes, which could improve returns from peak season mango production.

In order to increase production in the off-season, PRISMA has been working with Syngenta to improve access and knowledge of crop manipulation technologies through the Mango Early Flowing Off Season intervention in Lombok. Farmer-to-farmer activities, EXPOs, and farmer field days have been conducted to expose farmers to the use of a combination of chemicals for effective off-season mango production — Cultar, AmistarTop, and Actara. Cultar is a systemic plant growth regulator that promotes early flowering in fruit crops. AmistarTop is a fungicide, while Actara is a pesticide.

The PRISMA approach to improving farmer incomes in this area has been to promote off season harvesting technologies:

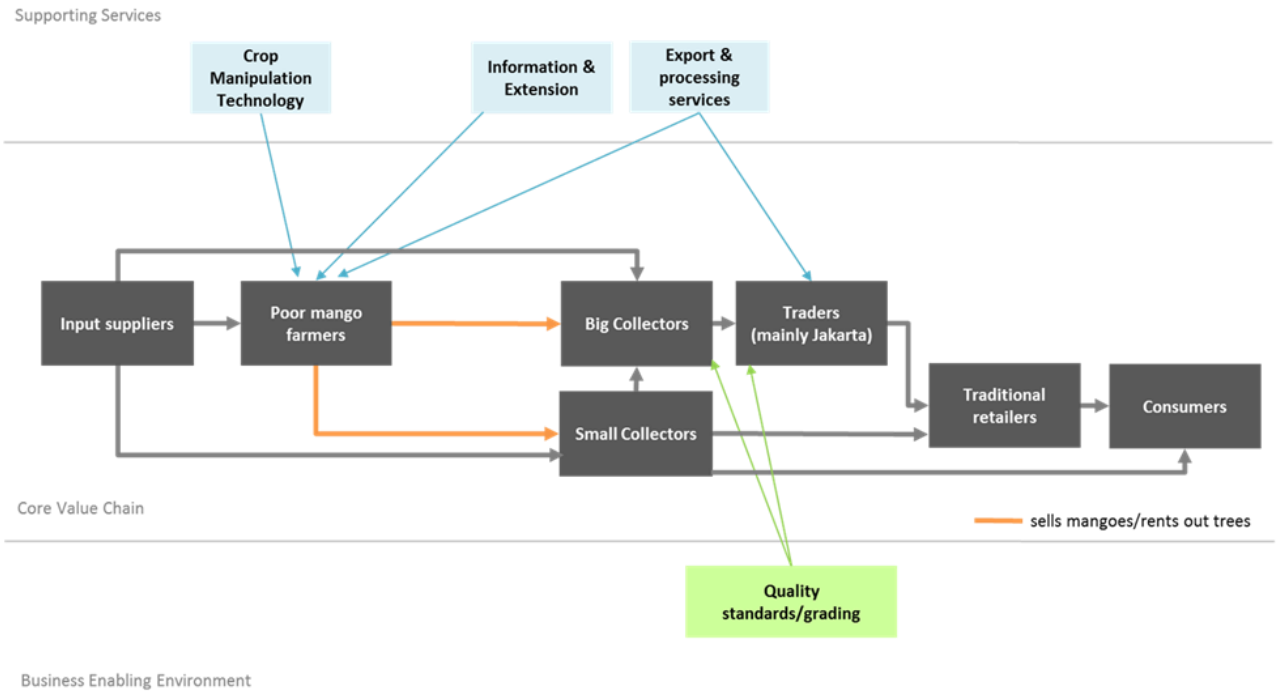
1. **Promote early flowering technology.** PRISMA and Syngenta are working to identify collectors and lead farmers who would:
    a. Promote early flowering agrochemicals (marketed by Syngenta as Cultar, Amistar Top and Actara);
    b. Collaborate to promote Learning Centres for demonstration purposes and to provide information;
    c. Demonstrate the application and impacts of the agrochemicals through key events (such as expos and farmers' field days or field trips), and
    d. Learn more about early flowering technology in order to disseminate the knowledge and skill to the farmers within their network to ensure the use of the technology.
2. Identify and invite mango farmers to attend early flowering technology training and promotional activities. Since many mango farmers have never heard of the technology, or have prior misconceptions, attending a training will give them a clear idea of early flowering and its benefit.
3. Identify locations suitable for demo plots so that more farmers can understand the benefit of the technology. This is built upon the success of the pilot program which showed that demonstrations increased the sales of the chemicals.

[1] The tebasan system is a method of harvesting in which the farmer sells for cash the standing crop of paddy to a labor contractor (penebas) before the harvest. The penebas hires his own workers, often a group of laborers from his village who travel throughout the region harvesting for the same contractor.

4. Prepare a database of category C collectors to enable Syngenta to identify which collector to target for each demonstration. Mango collectors usually collect from around 15 farmers each, thus by increasing an outreach for collectors will help increase the outreach to farmers.
5. Train Syngenta staff to enhance their capacity to prepare and run the mango demonstration plots. The need for training will be assessed based on the experience of the pilot demonstrations.

As seen in the figure below, the core market is dominated by collectors. Collectors are entrepreneurs that rent mango trees (but some collectors are also farmers of mangos) and buy mangos from multiple sources then sells in bulk to traders, but may also sell directly to the market. Input suppliers are typically agrochemical companies such as agricultural retail shops. Syngenta does not sell directly but instead distributes through local dealers. The smallholder mango farmers do not have as much power in this market as collectors. These farmers typically has less information and experience in mango cultivation and market, and usually rely on collectors. The farmers understand more about cultivating their primary crops like rice and maize.

The PRISMA intervention is through the supporting services and improving the business enabling environment as seen below. Although the main target beneficiaries are smallholder farmers, it has been necessary to also target small collectors (who usually are more likely to be poor than large collectors), as many of them are also doing farming practices and they are key influencers on smallholder farmers.



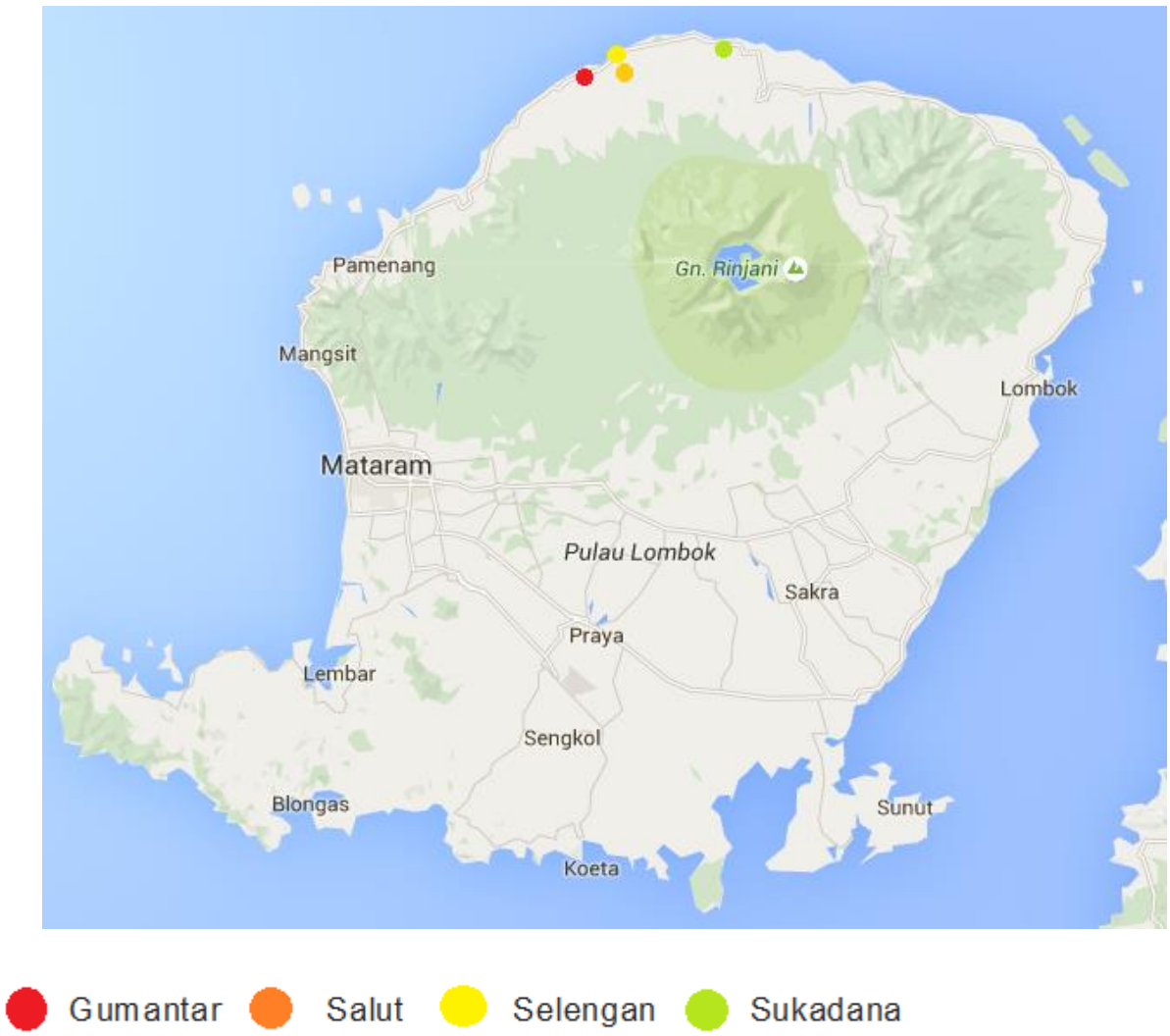
If farmers successfully harvest during the off season through EFT, then they are highly likely to increase yield also during peak season. This peak season benefit is embedded in the EFT technology. As of the first semester of 2016, the team has been planning to introduce social marketing campaigns in Lombok to increase farmer knowledge of EFT and income increasing opportunities in mango cultivation.

3.2. Map and demographics

The intervention in in Lombok currently works in Northern Lombok and Eastern Lombok, and this study focuses on the Northern Lombok area. The villages of Gumantar, Salut, Selengan and Sukadada were chosen for sampling and many farmers from these villages participated in the training event on Early Flowering Technology held by Syngenta in 2014 and 2015. The field teams' experience indicated that the sample villages are very similar, and village livelihoods and economic activities are strongly determined by the geographical context. The villages span from the northern coastal area, where fishing is predominant

next to wetland agriculture in the lowland areas and dry land agriculture in the highlands towards Mount Rinjani. The main road on the Northern coast is the main economic vein for this area, with small shops, warung (small restaurants) and major markets concentrated along this main thoroughfare. When leaving the main road and following small roads up to the higher areas, the sub-villages use traditional building materials and in some of the most remote sub-villages, houses are still built from wood and mud. Mango trees are widespread in all of the sample villages, and most farmers (over 90 percent) have trees in their fields or in the yard of their houses. However, only a few farmers actively manage and prune their trees and a only a handful have larger mango orchards.

Figure 1: Map of Lombok region



The main economic areas of these villages are connected by the main paved coastal road, with many sub villages connected by dirt roads. Gumantar is the largest village closest to the tourist hub Senggigi, while Sukadana is the furthest from the Lombok capital Mataram.

Table 3. Overview of villages sampled

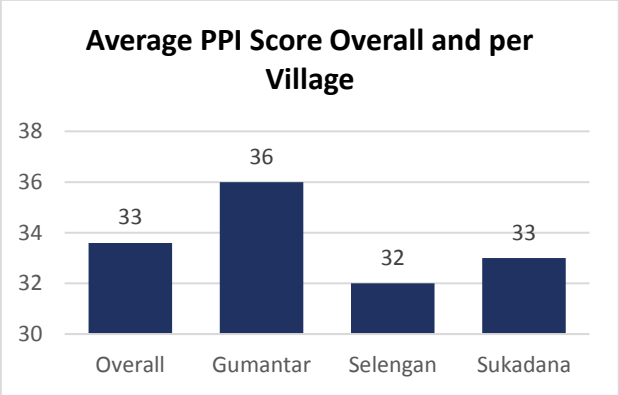
VILLAGE OVERVIEW	Gumantar	Selengan	Sukadada
Sub-district	Kayangan	Kayangan	Bayan

No of households	564	355	192
No of Cultivated Mango Trees	4006	8636	3470
No of Productive Mango Trees	3352	2439	3119

3.3. Sampling

The total sample size of the survey in North Lombok is 50 households, 17 in Sukadane village, 17 in Selengen village. 15 in Gumantar village and 1 in Salut. In most cases Salut will only be representative in overall household data and not individually as an outlier of the sample. 7 households per village were chosen randomly from the participant list of the training event on Early Flowering Technology held by Syngenta in 2014 and 2015. The other 29 households were randomly selected from a list of farmers provided by the head of village. There are no women headed households in the sample.

The sample used for the purpose of this study is meant to give a "general impression" of how and why people behave in certain ways. The sample size only can give indicative results of livelihoods of the region or sector and this should be taken into account when reading this report. This study is data led and the results from surveys conducted have been consolidated with qualitative interviews from key respondents such as religious leaders, village heads, farmer group heads and focus groups to arrive at reasonable conclusions.



3.4. Progress out of Poverty (PPI) Index

PRISMA's goals are tied to improving the incomes of poor rural households, and the programme uses the Progress Out of Poverty Index (PPI) that helps distinguish different poverty levels and vulnerability amongst different household groups. The PPI questionnaire is a set of 10 easy-to-answer questions answered by household members so the programme can make a quick determination of poverty levels. The resulting questionnaire produces a PPI score, which is converted to give a percentile or likelihood that a household falls below a set of poverty lines. For the purpose of this study, four quadrants were developed to compare PPI scores. This includes the poorest (<p25), poor (p25-p49), middle income (p50-p75) and better-off groups (>p75). Each quadrant contains roughly the same number of households in order to compare differences across PPI groups. The number of households per group is also reflected in the table 4.

Table 4 displays the likelihood of each quadrant falling below the 150% Indonesian national poverty line (USD 2) and the USD 2.50 2005 poverty line.

Table 4. PPI Scores and likelihood of households below the poverty line

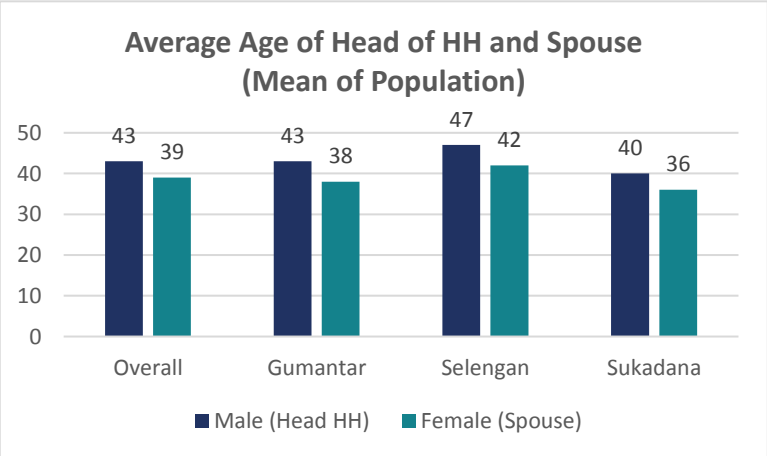
Quadrant PPI Score	Likelihood below Indonesian 150% (USD 2) poverty line	Likelihood below USD 2.50 poverty line
Poorest <p25 (11 Households)	76.2% and higher	95.2% and higher

Poor p25-p49 (14 Households)	17.4% to 65.5%	54.7% to 91.5%
Middle p50-p75 (15 Households)	0.9% to 9.9%	6.9% to 40.1%
Better Off >p75 (10 Households)	0.4% and less	3.7% and less

The average PPI score for the sample size overall falls within the poor range at p33, which means overall households on average are 54% likely to fall under the USD 2 poverty line and 87.7% likely to fall under the USD 2.50 poverty line. Both Selengan and Sukadana have the same likelihood as the overall sample, while Gumantar households are 40.7% and 79.7% likely to fall under the USD 2 and 2.50 poverty lines respectively. On average these villages fall within the poor category, and fall within PRISMA's scope to target poor smallholder farmers. There is scope for the PRISMA team to target even the poorest farmers (<p25)and this study can help in identifying the indicative characteristics of the poorest group through the data reported by PPI quadrant.

4. Livelihood assets[2]

This chapter aims at giving a broad picture of the socio-economic position of the target households in Northern Lombok, based on DFID's Sustainable Livelihood approach which incorporates 5 asset categories. Assessing these assets is the basis for understanding and evaluating constraints and opportunities that impact the livelihood strategies and subsequent decision making of the target households. The approach also helps conceptualize and understand ways households allocate and use resources to make a living given their specific socio-economic and natural environment. The 5 different asset types are analysed and explained below.



4.1. Human Assets

At the household level, human assets refer to the quantity and quality of labour available and this varies according to household size, education and skill levels, culture, leadership potential and health. It is therefore necessary, though not on its own sufficient, for the achievement of positive livelihood outcomes.

4.1.1. Household Size and Culture

The average household size for the sample is 4 members, with a minimum of 2 members and a maximum of 8 members in the household. The average number of children per household is 2 for all villages, and all household heads are male in the sample. 48 out of 50 household heads (96%) are married and no divorced households are reported.

The average age of males (all household heads in this sample) overall is 43 years with a range of 24 to 70 years, whilst the average age of females (spouse) is 39 years ranging from 20 to 62 years. Sukadana has

[2] The Livelihood Approach is based on the belief that people require a range of assets to achieve positive livelihood outcomes. The assets which people need can be categroized into human, natural, physical, financial and social capital. (Livelihood Strategies; Tomson)

a lower average age for both heads of households and spouses when compared to Gumantar and Selengan.

Usually parents live with their children only, and children typically establish their own household when they marry. Four households in the sample live with grandchildren as household members.

The main religion in Northern Lombok is Islam, which highly influences daily life. Most inhabitants fall within the Sasak ethnic group, which are linguistically and ethnically related to Balinese. Although none of the sample heads of household are female, women are highly influential in managing household finances and participating in agricultural activities in this region.

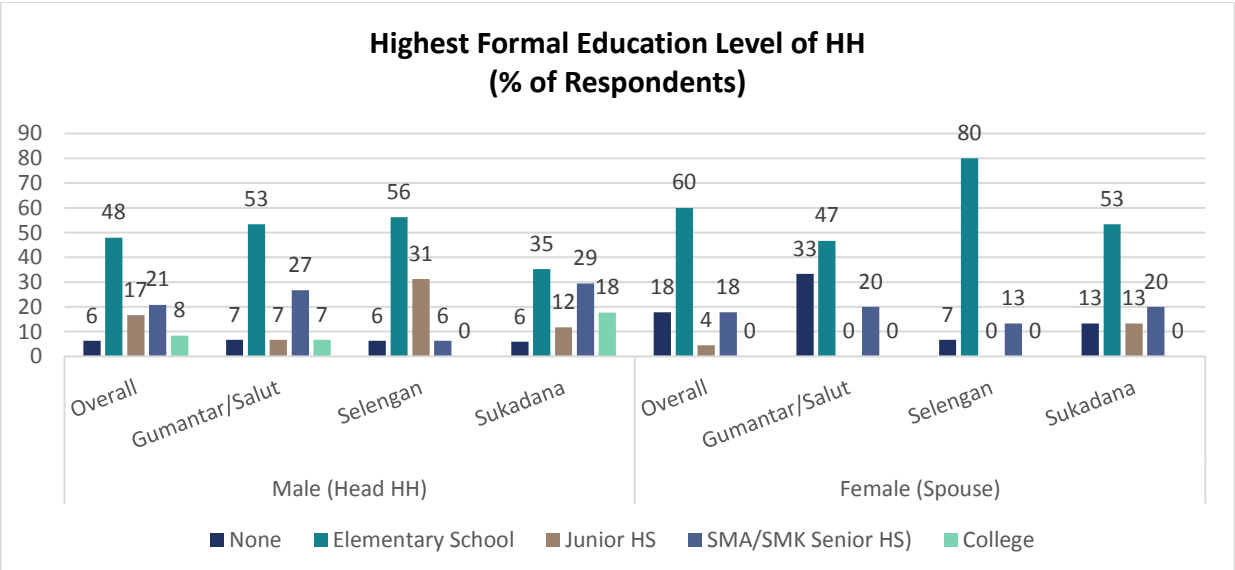
4.1.2. Education

In the sample villages, 94% of all household members age 16 or above are literate in Bahasa Indonesia, and 48 out of 50 heads of household are literate (96%), with the majority of those not literate falling in the 30-59 age group. Only 6% of household members age 16 or above stated that they did not go to school, which also matches the percentage of non-literate household members. A lack of money was the main reason cited for those who had never attended school. Overall, around 70% of male household members (age 16 or above) have completed high school compared to only 30% of females.

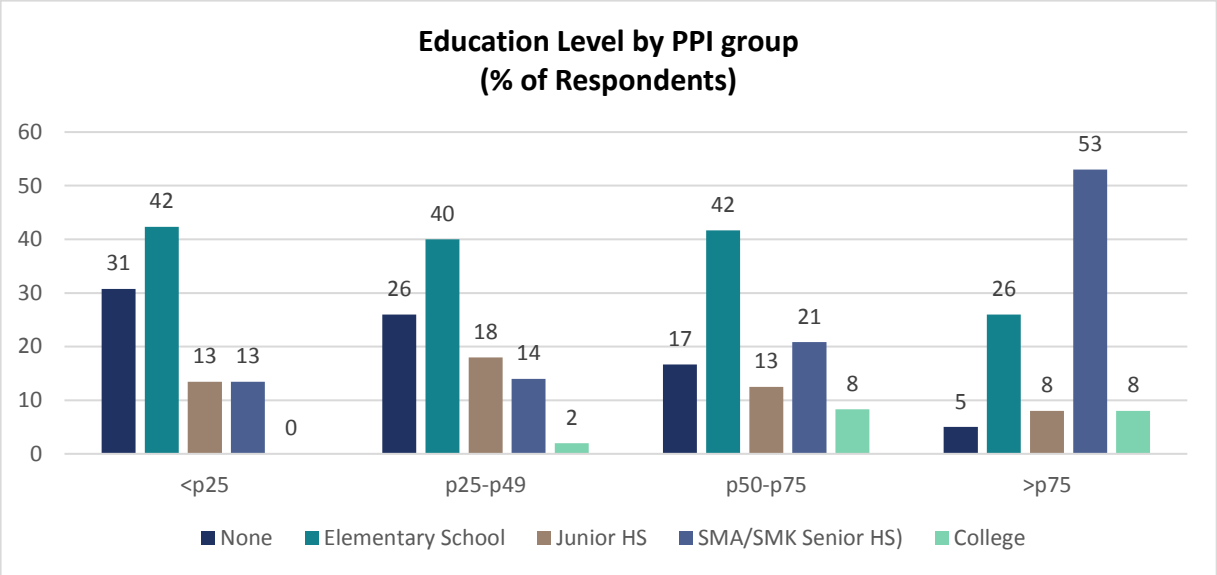
In general, the highest education level in the sample villages is relatively low compared to other study regions in Indonesia. **Men in general have a higher level of education compared to women and none of the women within the sample household hold a university degree.**

68% (34 respondents) of males and 72% (36 respondents) of females in the sample dropped out of school before accomplishing senior high school (SMA). According to the survey findings, the main reason for early dropout is lack of money (93% of total sample male and female). Other reasons mentioned are “marriage and pregnancy” (1 male/1 female) and “accomplished necessary education” (2 male/1 female).

While in other study regions education was clearly of very high importance, in the sample villages in North Lombok the importance of education was not emphasised in the qualitative interviews. The quantitative findings thus suggest a relatively high dropout rate to date. **70% of the sample households have children at schooling age** i.e. 6-18 years, and 9% of these children do not go to school in the study year (2015) because of a lack of funds.



Half of the household heads completed only elementary school with 17% completing junior high school, 21% finishing senior high school, and 8% being college graduates. **Spouses have lower education levels compared to heads of households, with 18% having no formal education,** 60% only completing elementary school, 18% finishing senior high school and no college graduates. Compared to other villages, Sukadana has a higher level of household heads and spouses with an education level above elementary school. Selengan has the least number of heads of household and spouses graduating above elementary school. This information can help teams in targeting areas with the lowest level of education where the population is more likely to be in the poorest category.



Examining education levels by PPI group, those with a higher percentage of being poor are significantly more likely to have never attended school (or attended but did not graduate) or only have elementary education when compared to PPIs with a lower likelihood of being poor. For example, over 50% of respondents in the highest wealth group have graduated high school while only 13% and 14% of the poorest groups have graduated high school. Elementary school graduates are similar for PPI levels 75 and below at around 40% of respondents. However, as 94% of respondents age 16 or over are literate in Bahasa, even those with no formal education have achieved literacy. This means communications in written Bahasa may reach a large audience, but communications may need to be more targeted when reaching the poorest households.

4.1.3. Health

The health condition of respondents is difficult to assess in the context of this livelihood study. Indicators used by this study are days not able to work due to illness and health expenditures. Only 3 households (6%) reported that during the past 12 months at least one member of the household was seriously sick and unable to work. There were no significant differences among the different PPI groups, and only 10% of the respondents reported to have had significant expenditures on health within the past 12 months (see chapter 6.2).

4.2. Physical Assets

Physical assets comprise of basic infrastructure and goods required to meet basic needs and productivity, which includes assets such as affordable transport, adequate water supply, clean affordable energy, access to information and secure shelter and buildings.

4.2.1. Shelter and Housing

Almost all farmers of the quantitative sample own their own house. Only one household rents a house and one family live in a house for free. Regarding the ownership status, 54% of the sample households have

an official ownership certificate and 46% do not have a written contract. The owners of the certificate are mainly men (80%), only 4% of the certificates are owned by women and in 16% of the households, men and women hold a certificate together and as a consequence legal title of the home. According to the quantitative survey, 85% of the houses in the sample are built with modern material and 15% are traditional houses build with mud, wood and bamboo.

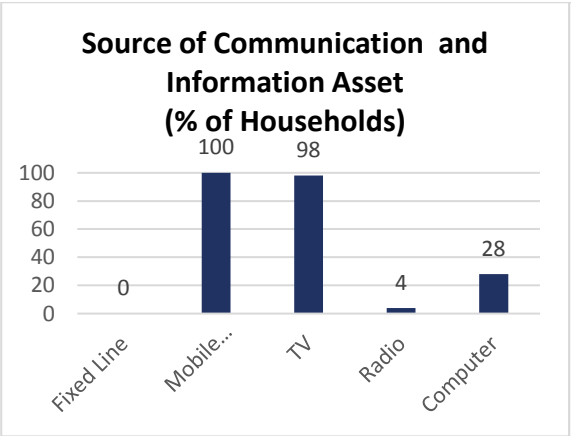
All of the households in the sample have access to electricity. According to the key qualitative informants, one sub-village in Gumantar village and four sub-villages in Selengen villages have no access to electricity. One village in the highland was provided with solar cells by the government. Some sub-villages have had to organise access to electricity themselves (by laying a cable) showing its importance in the community. The PRISMA team should check which sub villages have no or difficult access to electricity with main village heads for proper targeting of the poorest farmers.

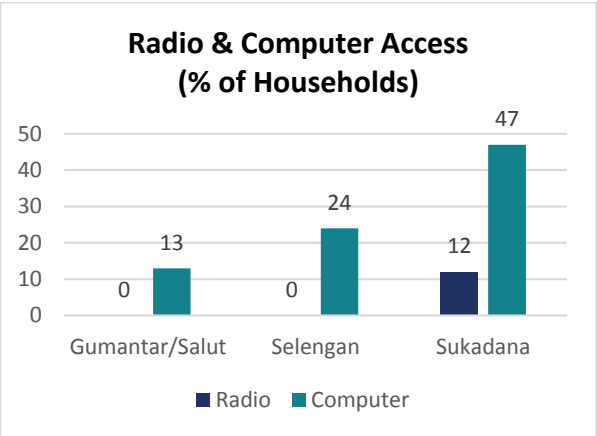
The main source of cooking fuel is firewood (61% of households), which the villagers collect from trees around their house or on the field. The key informants explicitly mention, that wood is not collected in the forest, because it is protected. Gas is a source of cooking fuel for about a third of households in the sample.

According to the heads of village in Gumantar and Selengen, a lack of proper toilet facilities is a problem. Only 10% of the population in Selengen and 20% in Gumantar have a toilet. **Each sub-village has a public toilet, but usually people use the tertiary irrigation[3] channels, which disperse water to their private plot.** There is an official penalty on using primary or secondary irrigation channels for defecation, despite the large amount of people using them. In Sukadana, everyone has a toilet with septic tank due to a government sanitation program in 2015. The survey findings reveal that 90% of the respondents stated having access to a non-flush toilet with septic tank. This result is likely due to respondents coming from the main village core, and the PRISMA team may follow the qualitative results stated above to reach sub-villages with the least access to toilet facilities and the more likely to fall within the poorest category.

Further analysis on housing infrastructure and differences among villages and poverty levels are dealt with in section 5.1 to evaluate poverty.

4.2.2. Household Assets



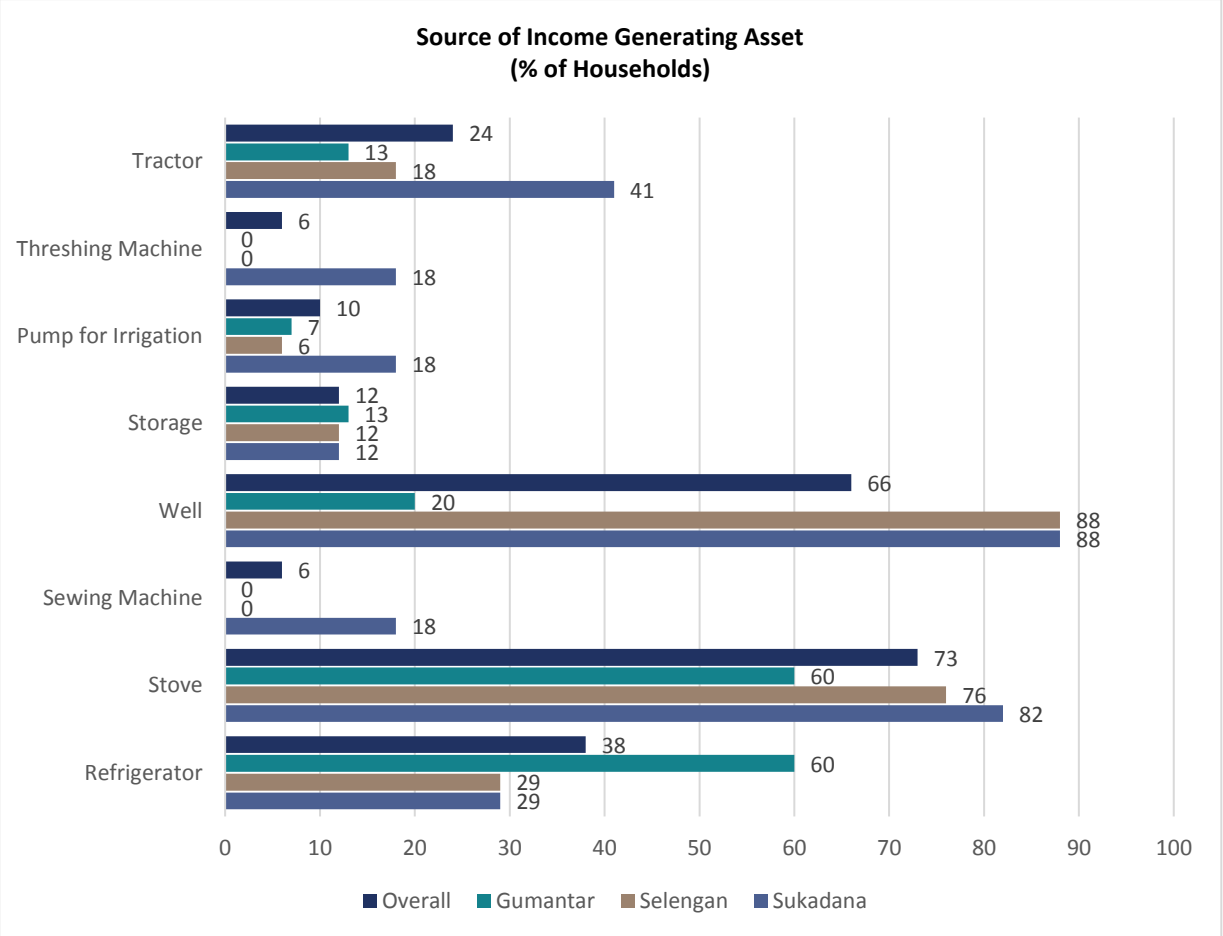


In general, there are no significant differences in livelihood assets across PPI groups but there are among villages. Survey results confirm that overall, households do not have fixed telephone lines in the sample

[3] The irrigation system in Indonesia is divided in primary, secondary and tertiary irrigation channels. Primary channels access the water source, secondary channels do the basic distribution and tertiary irrigation channels do the final dispersion to each plot.

villages in Northern Lombok, but almost all households own or have access to mobile phones and televisions and these could be employed by the PRISMA internal teams as a primary means of communicating with households in the region. Notably, radio can be accessed by only 4%, which is only 2 households in Sukadana. Computers are assessable to roughly 28% of households overall, with nearly 50% in Sukadana having access. Gumantar has the least access to both radio and computer. The differences among villages indicate that any intervention communication strategy in this region may greatly differ by village depending on the medium of communication employed. **A general communication strategy should employ mobile phone and television as the majority or all respondents in Northern Lombok have access to these communication channels, with no significant difference across PPI groups.**

All three villages are similar in terms of access to transportation. Almost all households (98%) have access to a motorcycle, while 38% own a bicycle and only 18% have a car. This indicates that there are few barriers to farmers reaching a farmer event or meeting or even tending to their farms.



Sewing machines, threshing machines, irrigation pumps and agricultural storage are the most absent assets among the villages. Stoves and Wells are the most accessible among all villages, while refrigerators and tractors are accessible to a moderate level. 38% of households have access to refrigerators, but much of that access is in Gumantar, with 60% of households having access.

Focusing on agricultural assets, 88% of households in Selengan and Sukadana have access to a well, while only 20% have access to this resource in Gumantar. 24% overall have access to a tractor, with Sukadana having the most households with access (41% in that village). Only 10% have access to

irrigation pumps, with Sukadana having more households with a pump compared to other villages. 18% of households in Sukadana village they have access to a threshing machine, which is the only village to have access. No villages stated having access to a drying machine.

Overall, Sukadana appears to have access to more agricultural income generating assets when compared to the other villages, with Gumantar having the least access. Sukadana household access to a threshing machine and tractor may indicate a larger share of grain agriculture when compared to the other villages.

4.3. Natural Assets

Natural assets are natural resource stocks including public goods (e.g. the sea) or divisible assets used directly for production (e.g. trees and land). Natural assets are very important to those who derive all or part of their livelihoods from resource-based activities such as farming, fishing, forests and mineral extraction. Natural assets tend to also greatly influence other assets important to livelihood. For example, farmers' production directly depends on the quality of soil, and when soil is polluted both farmers' health and crop quality suffer as a result.

4.3.1. Access to Land

In the quantitative survey, average land use is about 1ha, ranging from 0,04ha to 4ha within the sample of 50 households. Across PPI groups, the poorest group have slightly higher average land use compared to the poor group (1.24ha versus 0.98ha). Middle-income households have higher average land used compared to the better-off group (1.15ha versus 0.5ha). This trend in land use by PPI group is similar across villages. The average land used in Gumantar is 1.02Ha/HH, in Selengan is 0.87Ha/HH and in Sukadana, the average land used is 1.12Ha/HH. While these differences are small, it is noteworthy that overall the group with the highest PPI score of >p75 (the least likely to the poverty lines) have on average only 0.5ha versus the 1 ha average of the other groups, suggesting that the most well-off may have other sources of income outside of agriculture or are using their land more efficiently.

About 70% of the farmers own their land and 25% rent land from others. Around 93% of households that own land have a government certificate, and 6% do not have any ownership status. The holder of the certificate is almost always the male head only one female in the sample holds an ownership certificate.

The situation outlined by the key informants in the qualitative focus groups is somewhat different: Average land size is 0.5ha and only rich farmers have more than this which contradicts quantitative survey findings. The differences between the qualitative and quantitative survey may be explained by the type of respondents. The results of the qualitative study match the results of 0.5 ha land size of farmers in the highest income group (>p75), indicating that respondents who participated in the qualitative survey were more likely from this group and might be biased towards their own situation.

Most of the farmers own land, which they inherited from their parents.[4] Approximately two-thirds of agricultural landowners inherited them from their parents while a third bought land by themselves. The usual practice for heritage according to Islamic law allocates two-thirds of the land to a male and a third to female descendants. Regarding the ownership status, the village head of Gumantar states that most of the farmers do not have an official document. Farmers could actually claim a certificate, but only few do so, because they have to pay for it. According to the key qualitative informants, only 10% of the farmers rent land.

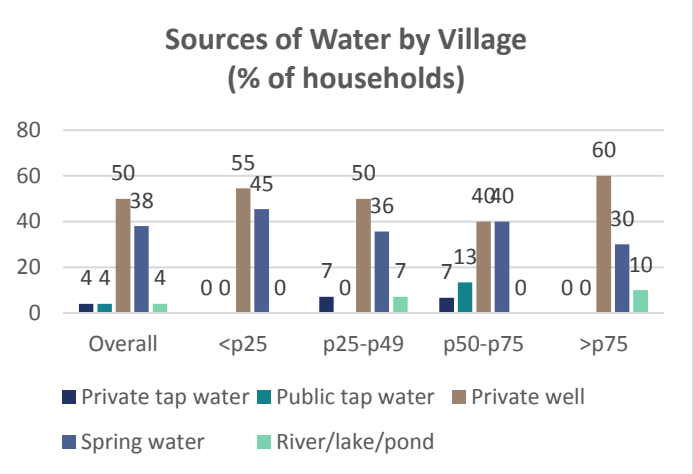
According to the ministry for agriculture (Dinas Pertanian), not only size but also the quality of land is an important factor since in North Lombok there is a lot of unproductive dry land. However, no household in the quantitative survey stated that they have any unused portion of land. This could indicate that

[4] Many farmers originally come from other regions to North Lombok and got land by the Transmigrasi program in 1969.

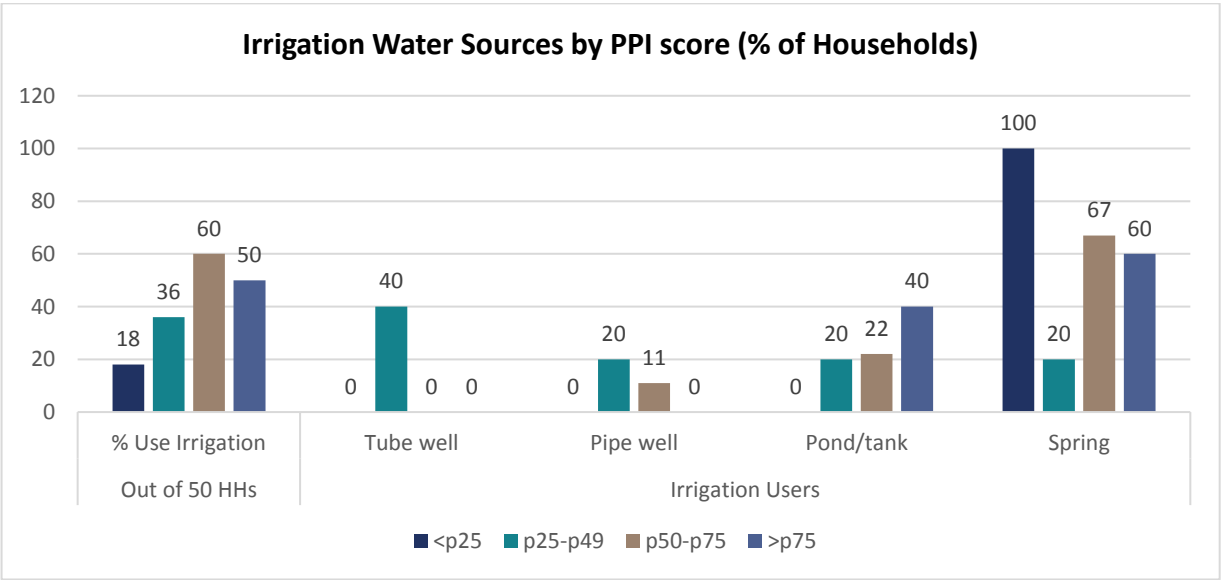
households avoid owning or renting low quality dry land, or they utilise all of their land, but a portion of it yields inefficient agricultural outputs. This survey did not explore the quality of land used, and this could be an area for further study in addition to a deeper understanding of size of land used across PPI groups.

4.3.2. Access to Water

Private wells and spring water are the most frequent sources of drinking water overall. Sukadana is almost entirely dependent on private wells, compared to Gumantar which is mainly completely dependent on spring water and other natural and public sources. This matches with the differences in asset ownership between these villages indicating Sukadana is in general a better-off village than Gumantar. Selengan sits in the middle with 53% of households have a private while 35% rely on spring water. Interestingly Selengan is the only village with some households having access to a private tap (12%). Across PPI quadrants, respondents in the lower PPI levels ted to rely on spring water more than the better-off category.



Only 21 households stated using irrigation (42% of the sample), and the main source of irrigation is from spring water, about 57% of respondents that use irrigation. 23% of these respondents use pond/tank for irrigation and around 9.5% use a tube well and pipe well for irrigation. Across PPI levels, those in the poorer categories are less likely to use irrigation than more than 50% of respondents in higher income categories. There may be opportunities between PRISMA and AIP-RURAL's irrigation programme TIRTA to jointly target the poorest farmers with the least access to irrigation in the region.



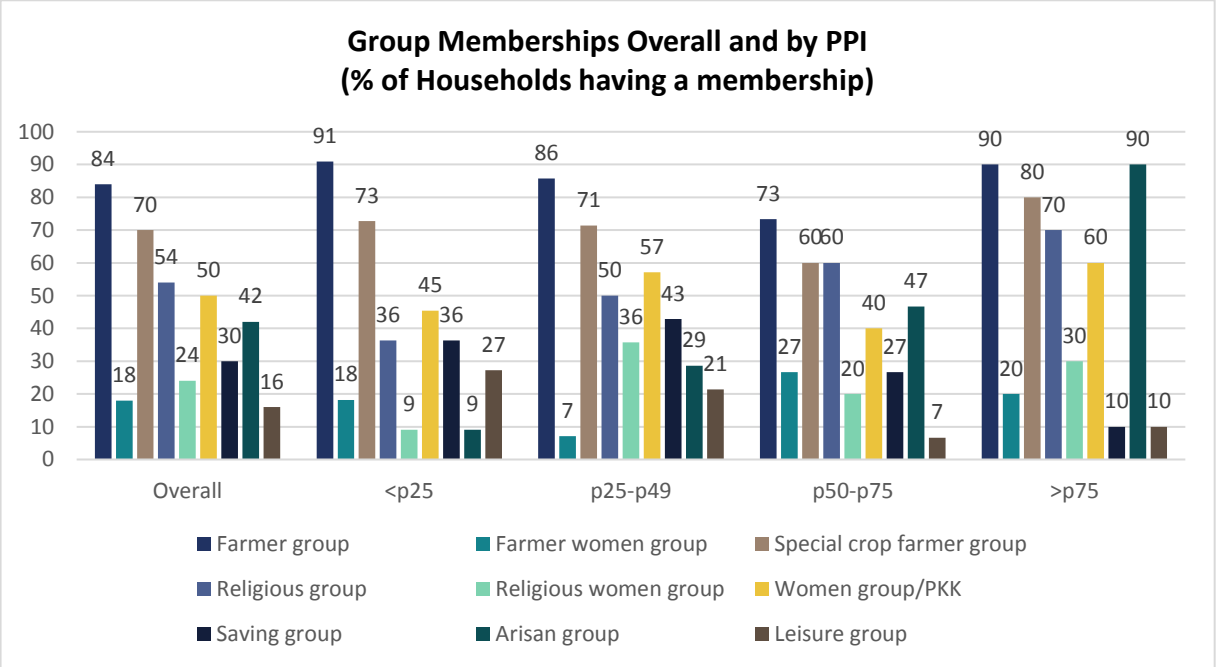
4.3.3. Other natural resources

Because the forests in this area are protected, all qualitative informants emphasised that villagers do not use wood from the forest. Firewood is usually collected from the trees in the garden or on the field. There is some indication of small scale honey production being undertaken but not organised. Some farmers have stated that they use honey for their own consumption or for sale. However, the use of forest products for consumption (e.g. wild cassava and honey) has decreased significantly within the past years. According

to the head of village in Gumantar, this is due to the fact that currently farmers apply better farming practices and can plant crops up to three planting seasons reducing reliance on natural resources, while before they only planted in rainy season, limiting income. Although the villages are in close proximity to the coast, only 10% of the qualitative sample fish for their own consumption and for sale.

4.4. Social Assets

Social assets are resources upon which people draw in pursuit of their livelihood objectives. These are developed through networks, communities, shared interests, group memberships and relationships which facilitate innovation, development of knowledge and sharing of that knowledge. The number of group memberships is commonly used as an indicator for social assets in the Sustainable Livelihood Approach.



Most households in the sample are members of farmer groups, with differences among PPI group minimal. Religious groups and Womens Groups (PKK[5]) each claim 50% membership among households. Memberships within these groups are higher if the household is least likely to be poor (>p75). The higher income group also holds Arisan[6] membership as important. Arisian groups can also be part of PKK which may have potentially skewed results towards Arisan and Womens Groups. Perhaps not surprisingly, households in the >p75 group are also less likely to be members of a savings group, while about 40% of households in the lowest PPI groups under p50 are members of a savings group. 23% or households above p50 (less likely to be poor) are members of Farmer women's groups, while only 13% of households below p50 (more likely to fall under poverty lines) have members in these groups.

Overall, there is a divide in social memberships depending on socio-economic status, with higher income households enjoying more opportunities for women, arisan savings and credit and religious affairs than lower income houses. Farmers groups (both general and for special crops) are common across all PPI levels, indicating the importance of these groups to the communities at large. The PRISMA team should consider group membership when marketing to farmers. For example marketing to a women's group-PKK

[5] The PKK (Family Welfare Movement), established in 1967 and reformed in 1998, exists throughout Indonesia and has been established to achieve the prosperity of the family

[6] An "arisan" is a form of Rotating Savings and Credit Association in Indonesian culture, a form of Microfinance

may be effective in targeting unemployed women, as many women in these groups are not working according to the team.

The average annual fee for a farmer group is 204,000 IDR, lower than the Arisan group where its annual fee is 1,360,000 IDR, explaining why Arisan groups are mainly accessible to higher income respondents. The main benefit stated by respondents to join a social group are listed in the chart below. Agricultural information is one of the common benefits for farmer, religious and women's groups, which indicate an array of options for gathering agricultural information for households.

Group	Main benefit(s) according to respondents
Farmer Group	Information on agriculture and purchasing agricultural inputs
Religious Group	Faith, social gathering and agricultural information
Women's Group	Social gathering, social service and information on agriculture
Savings Group	Additional income, gain investment, and for credit
Arisan Group	Additional income and social gathering
Leisure Group	Staying healthy

The main benefit to joining special groups according to 92% of respondents is information on Good Agricultural Practices (GAP). Only 8% mentioned access to machines and sharing workforce as a benefit.

Gotong royong 7 (community work) is highly important for community life and farming in the sample villages. Gotong royong for building and maintaining village infrastructure (roads, irrigation channels and waste management) is usually managed by the traditional leader in collaboration with the head of the sub-village. Some of the regular services are formally organised and delivered by the village government e.g. waste management. Farmers participate in gotong royong mainly for land preparation, sowing and harvesting. According to the head of the farmer group in Sukadane, there is no one in charge of organising these activities; farmers simply help each other when someone is in need and the associated social control is very strong. In Gumantar, there is a committee led by the traditional leader and the village head, which determines the order of the planting schedule. The village head of Sukadane emphasises the importance of gotong royong for poor farmers, who do not have the means to hire farm labour.

Regarding the role of the different leaders (governmental, traditional and religious) the survey findings suggest that the village head is perceived as the most important authority by 98% of the respondents, who greatly influences agricultural practices in the villages and a way of disseminating information. This means

[7] *Gotong royong* is a special form of community work, which is very common all over Indonesia. It works informally and is only based on social control mechanisms. The primer purpose is to provide public services such as building village infrastructure (roads or irrigation channels) and keeping the village clean. In some villages, *gotong royong* is also practiced in agriculture e.g. for planting and harvesting.

the village head may be a crucial stakeholder for the PRISMA team in improving farmer knowledge on agriculture-related activities, and the team should seek his/her buy-in.

The Indonesian and local government are also highly present in the lives of villagers, with 80% of the respondents from the total sample receiving support from a government program. The majority, 74%, get subsidised rice from the Raskin[8] program, 30% get health fee waivers through Jamkesmas[9], and 14% receive benefits from the PKH[10], a conditional cash transfer program which 12% of the sample households receive. The support for rice production from the government might explain why rice is a major crop in Northern Lombok, and may be a barrier to farmers producing or better managing other costlier or labour intensive crops like mangos.

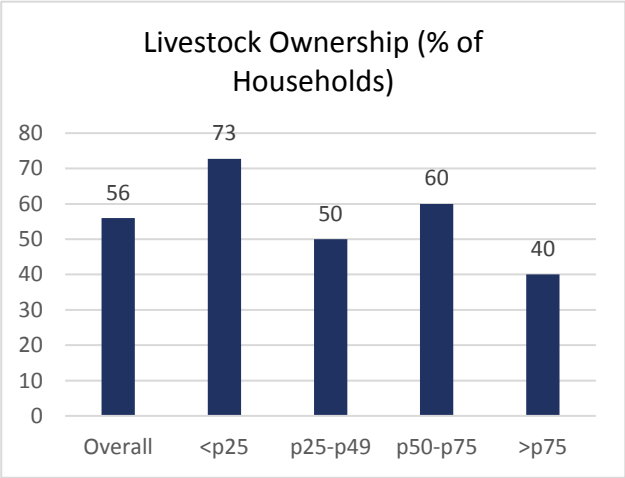
4.5. Financial Assets

Financial assets refer to the availability of cash, near cash or its equivalent which enables people to adopt different livelihood strategies. There are two main sources of financial assets – first, available stocks; such as savings - which usually do not have liabilities attached to them or entail reliance on others, and second, regular inflow of money (i.e. excluding earned income) - usually pensions or transfers from the state and remittances with the key being regularity of the inflow.

From the quantitative sample, there is only one household with cash savings, and this respondent is from the highest PPI group. All households do not have access to a bank account. 86% of households have stated this situation has remained the same over the years and has not changed, while only 6% of mention that they experienced an increase. 8% state that they have experienced a decrease in their living standard.

As mentioned in the section above, 80% of households receive support from the government. However, across PPI groups, the p50-p75 higher income groups get more support than the lower PPI group. This indicates a misallocation of government support and the support is not effectively reaching the most vulnerable.

Only 10% of respondents in the total sample stated that have access to official credit or a loan. However from the qualitative data and quantitative expenditure survey, many farmers get loans from friends and family. The expenses paid through credit or a loan is dominated by health expenses, followed by funerals and religious ceremonies.



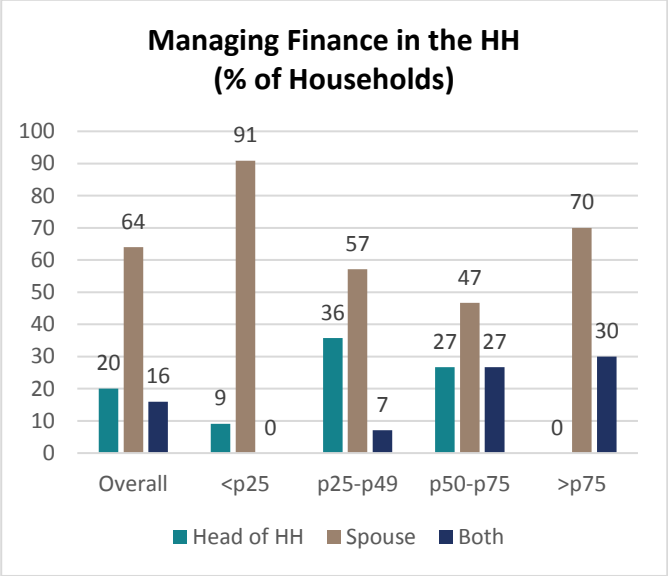
Livestock in these communities represent a form of savings for households. 56% of households have had livestock within the last 12 months. Across the PPI groups, the poorest households seem more likely to have livestock in comparison to the group least likely to be poor. This could indicate that the poorest depend on livestock as a form of savings in comparison to the wealthier group.

The three most common forms of livestock owned are cows, chickens and goats. Of those households owning livestock, 61% own cow(s), 75% own chickens, and 14% own goat(s). The average number of cows

[8] RASKIN: Government subsidies for low-income people in the form of selling rice at below market prices as an attempt to improve food security and providing social protection.
[9] Jamkesmas is a social assistance program for health care for the poor and near poor
[10] PKH (Program keluarga harapan) is a conditional cash transfer program targeted at very poor family, to meet their education & health needs.

owned is 2 per household. The average number of chickens and goats in households that own them is 10 and 11 respectively. According to the quantitative survey, 1 cow is sold every 14-16 months, while on average 7-8 chickens are sold each year and 1 goat is sold every 14-16 months. Sukadana relies most on selling cows, selling 4 a year, with Gumantar selling a cow only every 2 years on average. Gumantar sells very few chickens each year and is the only village to sell goats. Selengan sells the most chickens, around 17 a year, while selling only 1 cow a year. These results indicate that Gumantar relies less on or does not have access to significant cash yielding livestock as a form of savings. Selling livestock is often the last choice for financing expenditures, when there is no cash and no stocked harvest available and normally farmers immediately buy new livestock as soon as they can.

Overall, of those households with cows, around half stated that cows are managed only by men, and half are managed by both by male and females. The same half split is true for managing chickens, but 9% of households stated that only women managed chickens, which is a higher rate than cows. For those households with goats, 66% state that goats are managed by both males and females and 33% are managed only be men. This would indicate that men have more control over this form of savings than women, but women do have a high participation rate in at least 50% or more of households.



Despite having less control over livestock assets, 64% of household finances in general are mainly managed by women. 20% of the respondents' state that men are in charge finances and in 16% of the households', men and women manage the finances together. This means that women participate in managing general finances in 80% of households (including results of management by both men and women) and are an important target group when addressing financial vulnerabilities and financial products for the poor.

Overall, this area of Lombok is highly vulnerable from a financial point of view, with almost no cash savings, little access to credit and banking, and not many other forms of savings. Any shock in agriculture or livestock, such as livestock diseases, could have a marked impact on the wellbeing of a household in this community.

5. Poverty and Vulnerability

The vulnerability context is that part of the livelihood framework outside people's control. In the short to medium term, not much can be done to alter it. In essence, people's livelihoods are affected by trends, shocks and seasonality which could have significant effects on households, especially the poor. Shocks could be natural, economic, crop or human and seasonality may include changes in prices, production or even employment opportunities. Trends on the other hand are more predictable and not always negative. For example, new technologies may be beneficial to poor people. Shocks can destroy assets and even force people to dispose of other assets as a coping strategy. This section will discuss the vulnerability context of the households in Northern Lombok and their coping strategies, especially for the poorest households (p0-p49).

5.1. Poverty Assessment

In addition to assessing the likelihood of poverty per household, qualitative data on poverty perception was collected by asking village heads to describe their view of a poor, middle-income and better-off household

per village and the assets associated with each socio-economic position. The comparison of perceptions is shown in table 5 below.

Table 5: Perception of poverty by village heads:

Gumantar	Selengan	Sukanada
Poor household: • Very low income • Low education level (9 years) • Size of land not more than 0.5ha	**Poor household:** • Physical limitations • No secure job • House in bad condition • Limited education • Income is variable • If they have no income, they get food from neighbours • Only eat 2x per day • No livestock Income is estimated at 100'000 per month.	**Poor household:** • No land • Or not able to manage land themselves (old or disabled) • No livestock
Middle income: • Education higher (more than SMP) • Land size 1ha	**Middle income:** • Health condition is ok • House in bad condition • Uncertain job • Limited access to education (until SMP) • Work as construction workers, occasional jobs, farm labourers (e.g. carry rice from the field to farmers house, 20'000 per basket, they can get 100'000 per day but only during harvest season) • Livestock: manage livestock from others, they get 3 or 4th new born cattle • Has land but not productive (dry land, mostly in the hills)	**Middle income:** • Own land • Own a few household assets (not mentioned what assets) • The house is in a decent condition and allows them to stay healthy (cement floors, windows, height approximately 4m)
Better-off: • Better education • Land size > 1h • Own motorcycle	**Better-off:** • Access to health facilities • Good house • Good access to education • Secure income (farming included) • Own means of transportation (motorcycle or car) • Have productive land (size is not so important, quality is more important) • They give to others	**Better-off:** • Own motorcycle or car • Own more assets (not stated what assets) • Own store or warung (small restaurant)
Percentage: According to the village head 40 % of the total households are poor, 30% fall into the middle segment and 30% can be considered rich. There is no difference in cropping by poverty level.	**Percentage:** No data	**Percentage:** Well-off 5%, poor and very poor 95%. It is hard to differentiate because the border is flexible. Even if villagers have land, they always have needs (e.g. education) where they will use income from agriculture and livestock. It is always an uncertain situation. 600 households (out of 1900hh) are very poor because their house is in a very bad condition. Trend: stagnant

Each village reveals differing perceptions of poor, middle-income, and better-off, but common perceptions of poverty is the lack of land. Most of the positive developments in villages mentioned by respondents were introduced by government programs i.e. improvements in housing and infrastructure. The government

seems to be more active in Sukadana than in the other villages. According to the statements of several key informants, migration work has also contributed to improve living conditions in the sample villages. Most of the migrant workers send back money and use the earnings to renovate their house or invest in agriculture or a small enterprise when they return home.[11]

5.2. Vulnerability, Shocks and Food Security

According to the quantitative survey, 2 to 3 nutrition sources are consumed daily. In assessing non-staple (food other than graints) diet across villages (non-grain food sources), vegetables are consumed daily, and fish and tofu are more likely to be eaten daily than other types of food as listed in the table below. Nutrition sources from animal protein other than fish are the most lacking, with over 50% stating they never eat chicken and over 80% not eating meat. Over 60% also do not eat fruit on a regular basis, and protein like eggs are only consumed once or twice a week by over 65% of respondents.

Consumption Frequency per Week	Chicken	Tofu	Vegetable	Eggs	Meat	Fish	Fruits
Never	56%	10%	0%	16%	86%	4%	62%
Once	26%	8%	0%	38%	14%	6%	14%
2 times	12%	20%	0%	28%	0%	14%	10%
3 times	0%	22%	0%	14%	0%	12%	0%
4 times	4%	14%	0%	0%	0%	10%	2%
5 times	0%	2%	0%	0%	0%	12%	0%
6 times	2%	2%	0%	0%	0%	0%	0%
Daily	0%	22%	100%	4%	0%	42%	12%

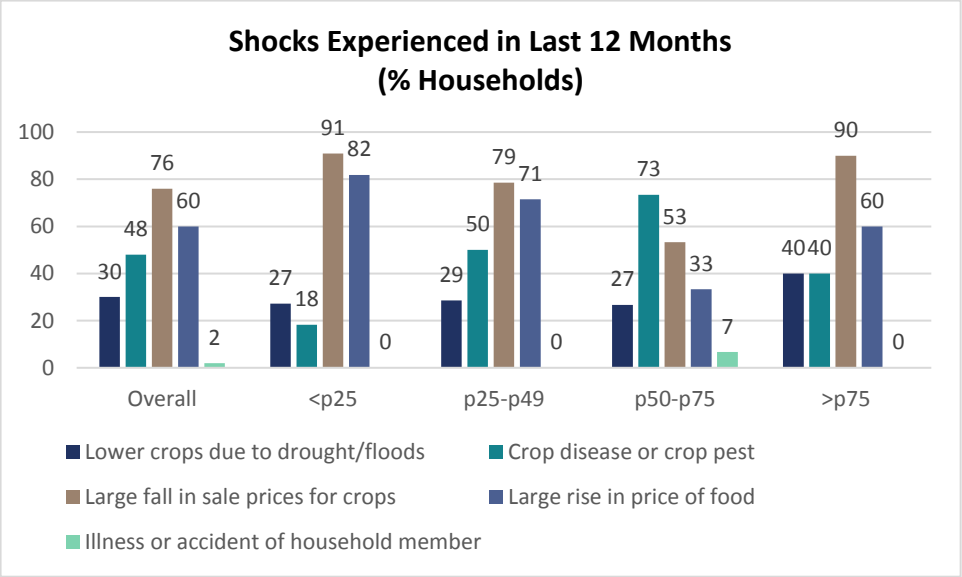
Food security appears to not be seasonal in Northern Lombok, with around 60% of respondent reporting enough food throughout the year and around 35% consistently reporting not enough food regardless of the month. There are no significant differences in the nutrition situation between the months.

Coping strategies to overcome any food shortage reported by the survey respondents are mainly eating less food in general and less meat and vegetables as a first step. As a second step, the respondents borrow money from friends and family. There is only one respondent who sold livestock and one who reported to receive food aid.

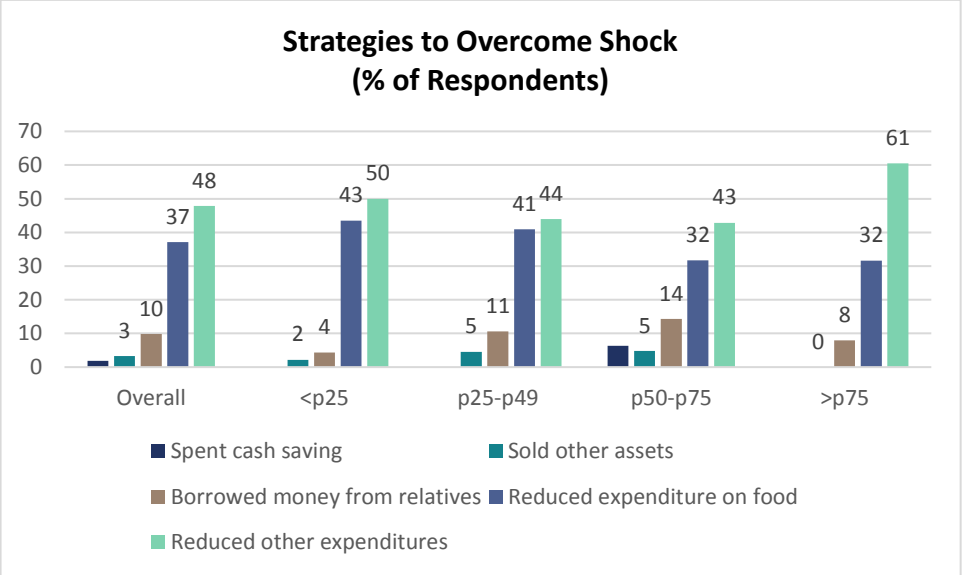
Overall within the year, the most difficult month in terms of livelihood shocks is in February. The “difficult” period starts from November and increases until February (peak) to continue until March. The top 3 frequently mentioned reasons for difficulty are a lack of cash (53%), workload (20%), and food availability (11%). This result is similar across all respondent groups.

[11] Migration work is organised by private companies that send workers to the Emirates, Saudi Arabia and South Korea

The most mentioned shocks affecting households are reduced sales prices for crops (76% of households), rises in food prices (60%), and crop diseases and pests (48%). About a third of farmers experienced loss of crops due to floods or droughts. **The poorest groups are more vulnerable to rises in food prices compared to higher income groups, and the poorer groups (under p50) are also more vulnerable to falls in crop sale prices compared to the average for groups above p50.**



In general, the main result from shocks reported by households are losing both income and assets. The most common strategies adopted and reported by farmers to cope with or overcome these shocks are (in order of importance) reducing other expenditures, reduced expenditures on food, and borrowing money from relatives. Active management of secondary crops like mangos could be presented to the poorest farmers as a potentially a method of income diversification to reduce these shocks.



Strategies to overcome the above stated shocks are reducing expenditures in general and expenditures on food for all households. This reflects the vulnerable financial situation of the community where almost all households in the study reported not having any savings.

According to the qualitative findings, temporary migration to work abroad is also a common strategy to overcome poverty and reduce shocks in North Lombok. One informant mentioned that it is difficult to find people in the village willing to work as farm labour. People would rather go elsewhere for work than perform

what is considered a low status job. While there was a big emphasis on migration work in the qualitative interviews in all sample villages, none of the household heads or spouses of the quantitative sample temporarily migrated for work in the past 12 months. Only 10% of households had a member that migrated, and the reason given was mainly for school. The quantitative sample represents farmers with mango trees while the qualitative sample states migration for the community overall. This discrepancy could be explained as stated in section 6.1 as many people without land migrate for work, and the quantitative survey interviewed only households with land.

6. Choices and Livelihood Strategies[12]

Further to understanding the assets farmers have access to and the vulnerability context, this section aims at discuss how farmers use and combine their assets to make a living. The drivers behind farmer behaviour given the asset available to them may be to:

- meet basic needs
- protect assets i.e. minimize exposure to risk or increase coping capacity
- increase assets/income
- increase consumption.

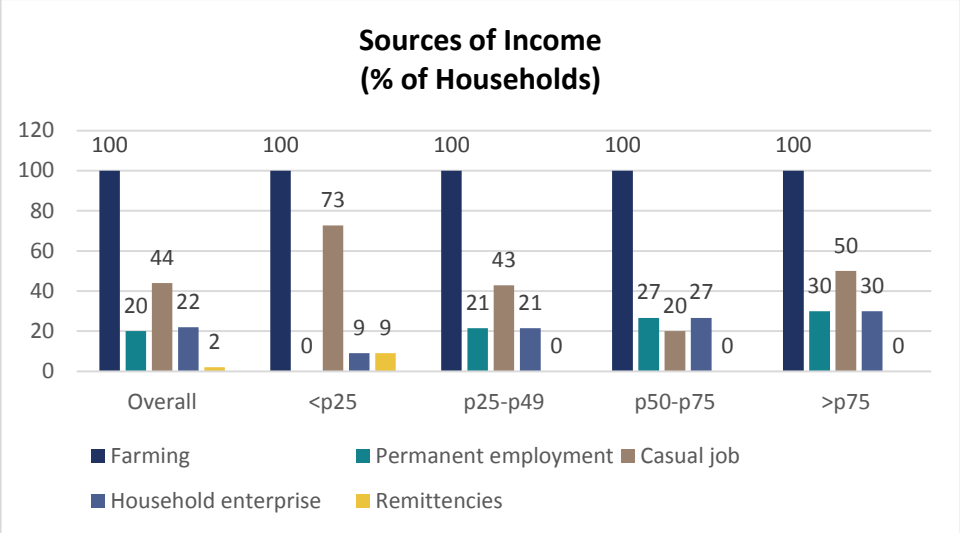
These priorities can be discussed broadly under income sources and expenditures with an emphasis on evaluating the behaviours of mango farmers.

6.1. Income Sources and Farming

According to the qualitative findings, the main sources of income for the total population in the sample villages are farming (approximately 70%) and fisheries (approximately 25%). Employment opportunities are limited and a few farmers get additional income from a small enterprise or from livestock rearing. Casual jobs like farm labour or market worker (carrying, packaging or parking assistant) are important to most of the farmers. Women are often employed through selling agricultural products and fish in markets.

Mostly people without agricultural land go to work abroad for 2-3 years, usually with an organized program. Both men and women do migration work: men usually work as construction workers or in the palm oil industry in Malaysia or Kalimantan and women work as housekeepers in Saudi Arabia, Taiwan, Brunei and Singapore. Most of the men migrate abroad before marriage, while most women go while already married.

[12] The term livelihood strategy is used to describe the range and combination of activities and choices that people make in order to achieve their livelihood goals (Livelihood Strategies, Thomason Kalinda and Augustine Langyintuo, 2014)



In the quantitative survey, all respondents are farmers thus 100% of the sample derive income from agricultural activities. The majority of households rely on 2 or more sources of income for their livelihood with 66% having diversified income sources. The importance of a casual job as an additional income source is clearly reflected in the survey findings. While only 34% of the total sample households get income solely from farming, 44% of the respondents report to have casual jobs. Casual jobs are mainly carried out by men (approx. 80%). 20% of these farmers also have income from permanent employment (men 60% and women 40%). 22% have income from a household enterprise which are often owned and managed by women (74%), and only 2% that have income from remittances. The poorest farmers are more likely to work casual jobs (for example laboring on other farms) than higher income groups, and the poorest are also less likely to have their own household enterprise in comparison to higher income groups.

As farming is the main sources of income in this area of Lombok, the table below focuses on planting patterns which also indicates income flows. There are 3 harvest periods for irrigated land in North Lombok, one in the rainy season (Dec-Mar) and two in the dry season. Typical planting patterns in irrigated areas are:

Table 6: Planting seasons for different crops

	Dec - Mar	**Apr - Jul**	**Aug -Nov**
Cropping Pattern 1	Paddy	Paddy	Maize or Peanuts
Cropping Pattern 2	Paddy	Maize or Peanuts	Paddy

According to the Ministry of Agriculture (Dinas Pertanian) in North Lombok, agricultural land is divided into wetland in the lowland areas (8400ha) and dry land mainly in the highlands (16'599 ha). 4105 ha are non-productive land never used due to lack of water.[13]

In dry land areas, the cropping is diverse, since the land is very heterogeneous in North Lombok. In rainy season, farmers typically plant Maize (hybrid or local) and different horticulture crops, and in the dry season a larger proportion of land lies idle. There have been no changes in cropping within the last years, and the

[13] There is an irrigation project from the government to access the non-productive land. Paddy, maize and peanuts are the most important crops for consumption in North Lombok.

PRISMA team may benefit farmers by studying crop patterns and introducing dry condition tolerant crops in the area.

Paddy is the most important crop for consumption. Maize and peanut are planted for sale but also contribute to household consumption. The decision whether to plant maize or peanuts is based on the market price. In 2015, the price for peanuts was higher than maize which encouraged farmers to shift crops accordingly. For peanuts in Northern Lombok, farmers have a contract with Kacang Garuda, a large Indonesian company that collects the peanuts directly from the fields. Cassava is only planted in household gardens or for intercropping with maize without irrigation. There are several spots for horticulture in the highland area and the most important horticultural crops are chilli (mainly in the west of north Lombok), celery, tomatoes and shallots (in the East of North Lombok). The most important crops for income in order are paddy, maize, cashew (in wetlands), tomato, chilli, long beans and cucumber in dry lands. Tree crops that contribute to income are mango, coconut, cocoa and banana.

The timing of planting and harvest depends on irrigation and farmer groups have to agree on a schedule to regulate the planting season. If all farmers plant rice at the same time, there is not enough water in peak times. The formal irrigation system is managed by the "Association of Farmers Who Use Water" (PPPA or P3A) Perhimpunan Petani Pemakai Air. The association is based on the traditional system of Subak (Bali and Lombok), comparable to the Ghippa in East Java. In Hindu culture the village government is very close to the religious authorities, and both governmental and indigenous systems are combined, i.e. the villagers pray together before planting. This practice is still applied in North Lombok[14], although the main religion is Islam. The size of the land reached by the technical irrigation system is about 50% of the total wetland area, and the other 50% of land is only rain watered.

According to the Ministry of Agriculture the main challenges for farmers in North Lombok are:

1) Access to water
2) Market access: Usually the farmers sell at the farm gate to traders/collectors. Farmers lack information on market prices and have a very low bargaining position. Therefore, they get small margins on their crops. Only the price of rice is considered good, because it is guaranteed by the government and the government subsidises rice farming.
3) Technology: the level of technology in North Lombok is very low. There is potential to increase productivity and reduce the use of pesticides and fungicides and there is a need for developing technologies that work at the farm level.
4) Financial management at the farm level: getting higher prices is a challenge, and knowledge is lacking on how to best reinvest income.

The PRISMA EFT intervention team is actively addressing the market access and technology challenges, but other components of AIP-RURAL such as the irrigation programme TIRTA and the financial services programme SAFIRA could collaborate to address the financial and water access challenges, potentially providing a holistic increase in overall farmer income.

6.2. Expenditures

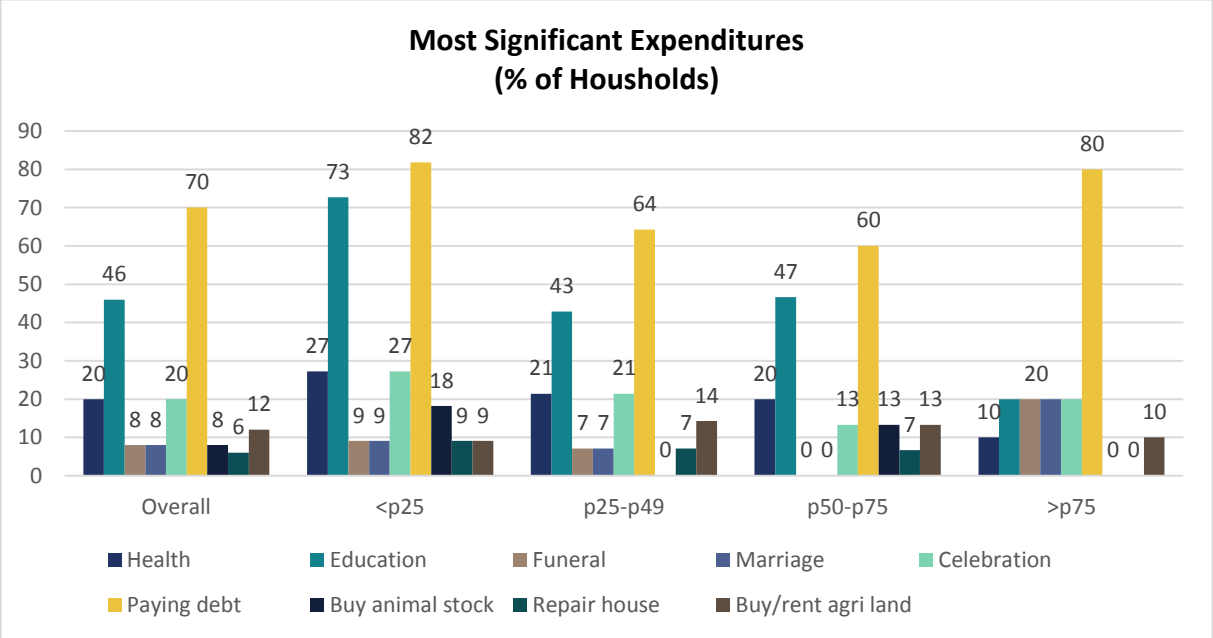
The top expenditure stated by respondents is repaying debts. 70% of households mentioned *repaying debts* as a significant expenditure which most of them finance by selling crops, potentially indicating that most farmers are likely to take loans to finance their agricultural expenditures, and after harvest they sell their crops to repay the debts. The qualitative findings suggest that access to finance is limited and there is no saving-borrowing system in the villages, reflected also in the quantitative survey. Usually farmers take loans with collectors who usually charge high interest rates. A few farmers borrow from moneylenders with even worse conditions. According to the village head in Sukadana, there are government programs

[14] Most of the population in North Lombok originally comes from Bali.

to facilitate access to finance and give loans with better conditions which although not named, could be an area of further study for potential agricultural finance partnership with PRISMA.

46% of the respondents report educational expenditures to be significant for their household. This is a relatively low share compared to other locations in other livelihood studies, which might be because SD and SMP (Elementary and Junior High School) education is free of charge in North Lombok, according to the findings of a women' focus group. The cost for SMA (Senior High School) is 90'000IDR per month for the school fee and 200'000 in total (including food and transport). Uniforms and books are paid once per year (SMA 600'000, SMP 500'000, SD 500'000). Other important expenditures are traditional and religious celebrations, which often require more expensive food or gifts. According to the women in the focus group, costs for everyday food needs such as fish, vegetables and chilli cost 150'000 per day per household.

Income increases and more favourable loan terms would potentially benefit farmers in this area and ease the high proportion of education and debt repayment expenditures.



7. Determinants and Mechanisms for Decision Making

This section aims to understand the rationale and mechanisms for decision-making in relation to the livelihood assets, strategies and priorities already discussed – with a focus on mango-related decisions. If livelihood decisions made are based on assets available and the perceived costs and benefits required, this section proposes to identify assets required for harvesting mango and discuss farmers' perception of cost, benefit and risk. Vital assets required for cultivation of mango mentioned by farmers include access to water for irrigation purposes and access to finance required to cover additional input costs. Some others are access to information about farming practice and a sizeable workforce.

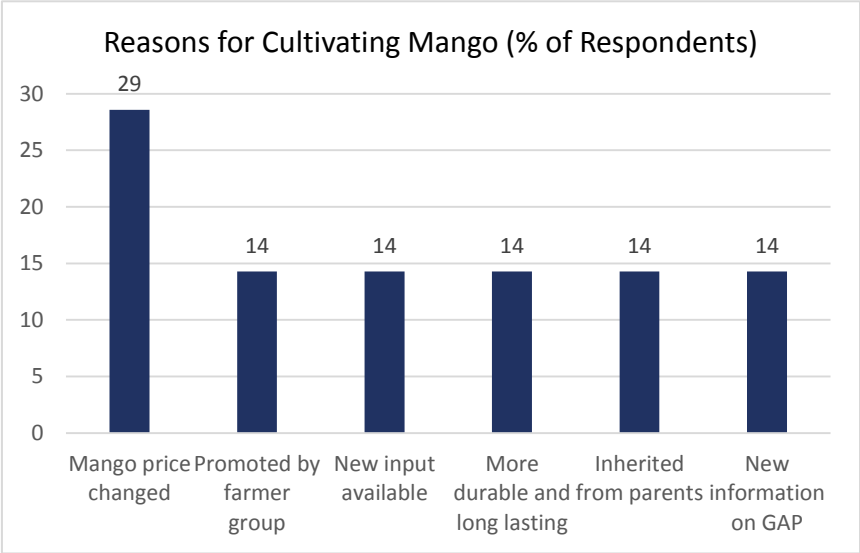
In this study users of Early Flowering Technology are not distinguished from non-users, as in the survey the majority of "non-users" stated having heard about EFT from using it in the past (90 % of "non-user" respondents". In future surveys, PRISMA may want to ask why "non-users" discontinued use, and in the case of the mango intervention these "non-users" most likely used EFT samples distributed by Syngenta and other private companies.

7.1. Focus on Mango

According to the qualitative findings, most of the farmers in the sample villages have mango trees in their garden or yards with only a few having large orchards. Many trees were originally planted by a government program in order to provide shade in the villages. The main mango variety is Arumanis, with a small number of farmers (less than 10%) cultivating the Madu variety, During the harvesting season (September to December) collectors from different regions, mainly Mataram and East Java come to the farms and buy directly at the farm. Usually mangos are sold by the tree and sometimes the collectors "buy" the tree in advance, and some "rent" the trees to actively manage them in order to get a better harvest.

32% of the sample cultivate only mango, and these farmers are not typical farmers but rather entrepreneurs (collectors). While collectors may be benefiting from the PRISMA intervention, they are usually first movers in the market, and small holder farmers will be more motivated to apply EFT during the off season themselves when they see the success of the collectors. Most of these entrepreneurs are renting and managing trees from other farmers and play both the farmer and collector role. Mango is a secondary crop for most smallholder farmers with 74% of farmer households cultivating three crops (including mango), 21% two crops and 5% four.

Farmers usually sell almost all mango yield and only use very little for their own consumption. In the past, the income from mango was not important for most farmers because the price in peak season is low and the risk for a bad harvest is relatively high when trees are not properly managed. As yield has been low in the past years some of the farmers are reported to have burnt their trees to clear land for other crops, according to the qualitative study.



Only a few farmers actively manage their mango trees by applying fertilizer, fungicides and insecticides. Usually, collectors are more concerned with the productivity of the trees and are willing to invest money and labour into managing mango trees.

The primary reason for cultuvating mangos for almost 30% of respondents is a change in mango price. This indicates that when farmers see a higher mango market price, they are encouraged to actively manage their mango trees. Usually considered secondary crops, the introduction of the Early Flowering Technology (first introduced in 2012) brings a very new dynamic into the market, providing incentives for farmers to manage their trees in the off season as well as on season for better harvest prices.

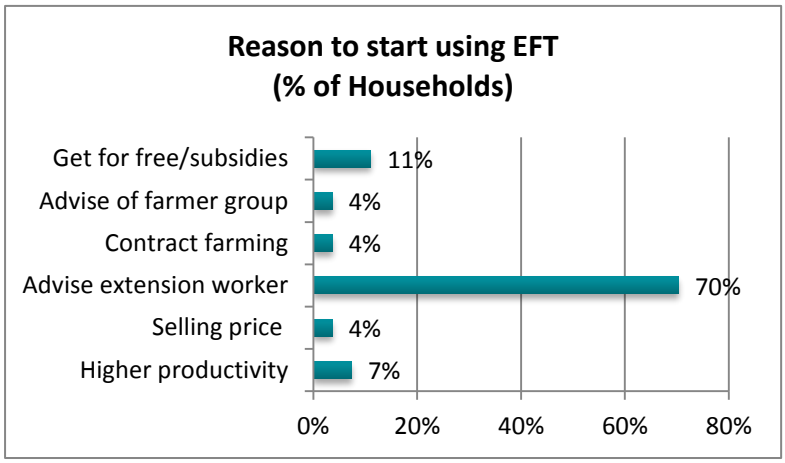
7.2. Users of Early Flowering Technology

According to qualitative informants, the decision on whether to introduce the Early Flowering Technology (EFT) depends on the personality of the farmer in question and their attitude towards risk. Farmers willing to take on more risk are more likely to apply the new technology while others may prefer to see the results from other farmers' experiences first.

A key barrier mentioned in the qualitative interviews is access to finance. Several key informants emphasise that EFT cannot be applied by poor farmers, with the cost per tree at 100,000 to 150,000 of

EFT per year. Another potential barrier mentioned in the qualitative interviews is the additional workload that comes along with applying the Early Flowering Technology. According to the team, workload is perceived as high because farmers never cultivate trees and are not used to working with mango trees. While costs are not particularly high compared to the cost of other crops, it is still considered a relatively large investment considering the risks and opportunity cost of manpower to manage trees and properly apply the technology; one of the dominant topics in the interviews.

Productivity perceptions is another barrier as the productivity of many mango trees generally has decreased in the past few years. The harvest of mango was very poor especially during the study year (2015), mainly due to the dry climate. Given this situation farmers are even more worried about taking risks to invest in mango. However if the farmer properly executes good pruning techniques, fertilising and proper GAP, lower productivity can be avoided according to the PRISMA team. These barriers to cultivating mango and using EFT can be overcome if the PRISMA team focuses on changing farmer perceptions of cost, opportunity cost relative to other crops, workload and manpower, and productivity.



In the survey, farmers who use the technology were asked why they do so. The dominant answer was because it was based on the advise of a private sector extension worker (i.e. Syngenta Agronomist). This indicates that extension workers are highly influential in farmer decision making. Government Extension workers in North Lombok are not very present and mango is not considered a priority commodity for the government. A partnership with the government encouraging support of the mango sector may greatly increase the likelihood that farmers will be equiped with mango cultivation knowledge, and potentially boost their income via exploting a neglected secondary crop. When asked about the expected benefits of EFT, the respondents mentioned mainly expected higher productivity (41%), higher selling prices (23%) and bigger size of fruit (18%). 18% reported to not expect any benefits..

At the moment, those who actually invest in Early Flowering Technology are entrepreneurs (collectors) and not the farmers themselves. According to the head of the farmer group in Selengen, no small holder farmer invests in EFT as of 2015. Farmers are interested in the technology and hope to get the chemicals for free but may not be able to pay for it. However, Collectors are the first movers in the market because they have the resources and cultuvation awareness to invest. Currently the PRISMA team has evidence that smallholder farmers are beginning to invest in EFT as a group, because farmers have begun to see the success first mover collectors have had with EFT. This has implications for the PRISMA team, in that the intervention may be currently relying on first mover entrepreneurs with the expectation that greater EFT visibility will trickle down to farmers. However, The intervention team at a more advanced stage should also consider addressing the financial barriers to small holder farmers who are willing but unable to invest in EFT.

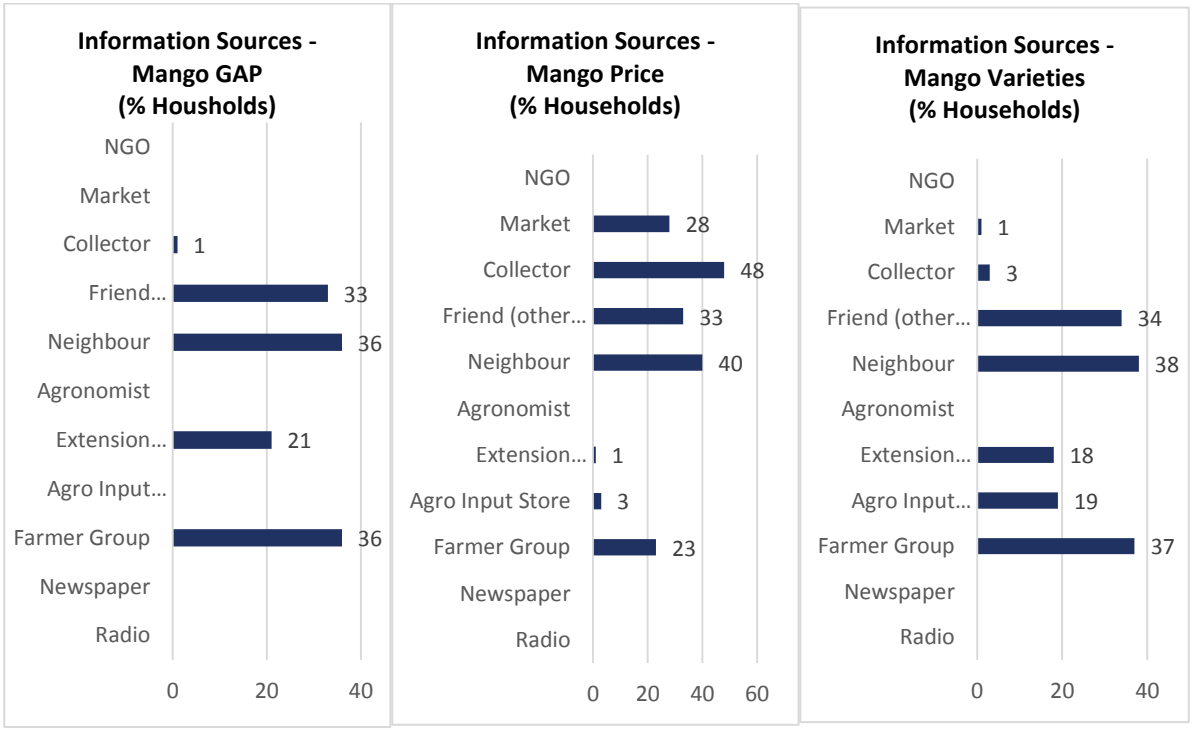
8. Decision-Making: Mechanisms

In order to better understand how decisions about mango are made the study focuses on three questions:

- What sources do farmers rely on in order to get information required for making decisions?
- Who in the household is involved in decision-making?
- Who outside of the household is involved in or influences the decision?

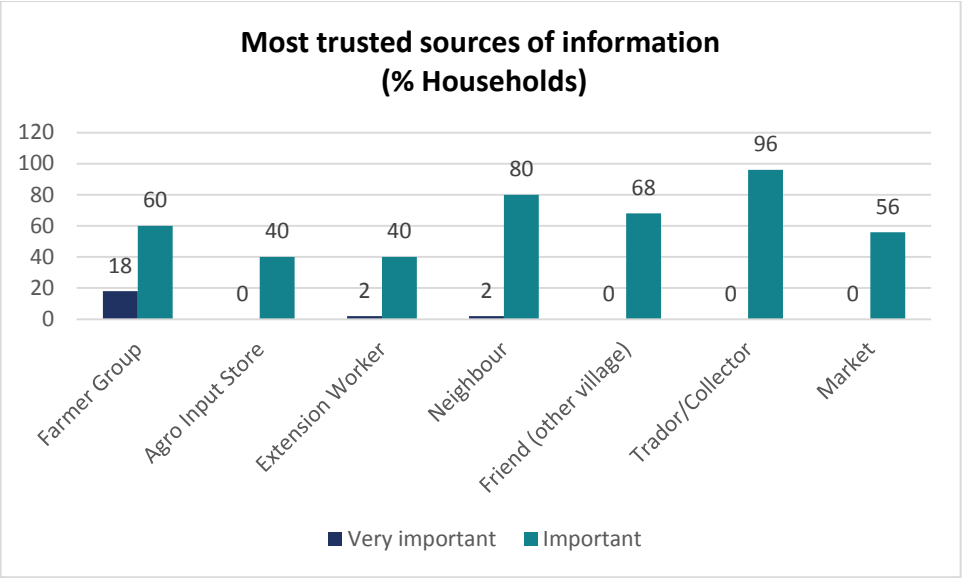
8.1. Sources of Information

Regarding mango cultivation, the most relevant information is on market price and GAP (Good Agricultural Practices) when applying the Early Flowering Technology. According to the Dinas Pertanian and several key informants, access to information on market price is limited in the sample villages and farmers mainly depend on the information from collectors. GAP information is usually by word of mouth. For example, village farmer groups sent some members to the training events of Syngenta in 2014 and 2015 and the information was spread to neighbours and friends informally. According to qualitative interviews and FGDs, women have limited access to information, especially regarding mango cultivation. Government extension workers focus on delivering information on horticulture practice to women and the women's farmer group in Sukadana, for example, learns how to plant tomato, chilli and other vegetables, rather than tree crops.



As illustrated in the graphs above, a farmers' personal network (friends and neighbours) are the primary information sources, followed by farmers groups. Collectors are the most trusted sources of information for Mango prices and extension workers are important sources of information on mango varieties, followed by agricultural input stores.

The PRISMA team will have to focus on various channels of communication depending on what aspect of mango cultivation they are messaging. For example, farmer groups may be a target audience for Early Flowing Technology and GAP communications, while information on off season pricing may be enhanced through better informing farmer groups and direct targeting of farmers. PRISMA should be aware of communicating price through collectors, as according to the team they have an incentive to mark down the price quoted to farmers.



Collectors are overwhelmingly cited as a trusted source of information for farmers. As mentioned above, while it may be best to communicate price through more neutral sources, collectors play an important role in disseminating information about GAP and potentially applying EFT.

8.2. Decision-making roles within the Household

Although most activities related to mango are conducted by men, women are involved in many decisions regarding mango, especially when related to expenditures and sales. Decisions about maintenance such as applying fertilizer, fungicides and insecticides and pruning are mainly dominated by men. The application of the Cultar Early Flowering Technology and the related decisions are both a male and female task.

The following table details an overview of decision-making roles related to mango. Interestingly, the quantitative respondents report that women never take any decisions on their own. This indicates that household roles in the sample villages are very traditional and the man is perceived to be the main decision maker. However, the qualitative findings suggest that women are dominant in household decisions, which may include expenses for agricultural inputs and sales decision. This discrepancy may be explained by the quantitative sample itself which was all male heads of households. In the quantitative survey male heads of households may perceive that they have all the decision making power, while in more diverse qualitative focus groups other perceptions come forward.

Table 7: Gender specific activities related to Mango[15]

No	Activity in production cycle	Task division		Explanation
		M	F	
1	Agreeing to do EFT	√	√	Discussed and decided together by male and female farmers.

[15] Focus Group Discussion with Women Farmer Group in Campor Barat

2	Pruning	√		Mostly done by male labors. However, when male labors will dig the ground, the female can be involved in pouring the substance.
3	Fertilizing	√		Mostly done by male labors. The female However, when male labors will dig the ground, the female can be involved in mixing and pouring the chemicals.
4	Cultar application	√	√	Mostly done by male labors. However, when male labors will dig the ground, the female can be involved in mixing and pouring the chemicals.
5	Pest & disease management	√		Mostly done by male labors.
6	Harvesting	√	√	Mostly done by labors of both male and female employer. However, it has been found that some female collectors climb the trees herself.
7	Deciding the selling method and to whom to sell	√	√	Discussed and decided together by male and female farmers.
8	Negotiating price		√	Mostly done by female farmers. The money from sales will most likely be managed by the female.

Overall, there is strong evidence that there is enough female ownership to encourage the PRISMA team to specifically target women in the EFT intervention.

9. Conclusions

In summary, the villages sampled in this study are core villages and although respondents are likely to fall under poverty lines, the PRISMA team can use this report to better target areas where the poorest live. For example, although there is electricity and toilet access in the core villages, the sub villages are often lacking electric, share a public toilet or use tertiary irrigation channels as toilets. This indicates that these sub villages may have a much lower PPI level than the core villages sampled, and in order for PRISMA to reach the poorest farmers, more study on these sub-villages should be pursued.

In the sample, most members of a household are literate in Bahasa, but half of men and 60 % of women have only achieved an elementary education level, and almost 20 percent of female spouses of household heads have also not received any formal education. Men in general have a higher level of education compared to women and none of the women within the sample household hold a university degree, and the poorest respondent s have lower education levels than those in higher income brackets.

Despite a male and female divide in education, women participate in managing general finances in 80% of households and are an important target group when addressing financial education and financial products for the poor. Most finances are managed in house, as households do not report having access to a bank account or any cash savings. Borrowing money unofficially through friends and neighbours is a common strategy to make up for a lack of cash savings, and 70% of households mentioned repaying debts as a significant expenditure which most of them finance by selling crops. Over 50% of households own livestock, and this can also be considered a form of savings.

However, this area of Lombok is highly vulnerable from a financial and income point of view, with almost no cash savings, little access to official credit and banking, and not many other forms of savings. Any shock in agriculture or livestock, such as livestock diseases or crop failure, could have a marked impact on the wellbeing of a household in this community. For example, over 70% of households have experienced reduced sales prices for crops in the last year, 60% of have also experienced rises in food prices and about

half have experienced crop diseases and pests. One key area PRISMA could examine is ways to reduce the financial burden of repaying unofficial loans which is most likely a result of these shocks and improve cash flow and savings. Furthermore, communicating that secondary crop management such as mangos can help farmers diversify income sources and reduce risks.

As mango is a secondary crop, only about a third of the farmers sampled cultivate only mango as a primary crop, and these are usually small collectors who are more specialised in mango farming. Otherwise farmers usually cultivate rice and maize as primary crops and rent out secondary crop mango trees for management by collectors. Therefore, Only a few farmers actively manage their mango trees by applying fertilizer, fungicides and insecticides. Usually, collectors are more concerned with the productivity of the trees and are willing to invest money and labour into managing mango trees. The primary reason stated for cultivating mangos is changes in market price, inidicating that when farmers see a higher mango market price, they are encouraged to actively manage their mango trees. Usually considered secondary crops, the introduction of Early Flowering Technology (EFT), first introduced in 2012, potentially brings a very new dynamic into the market, providing incentives for farmers to manage their trees in the off season as well as on season for better harvest prices.

However, there are some **key barriers** that PRISMA must address in order to reach small holder (non-collector) farmers more efficiently. **Financial burden perception** is one barrier, as several key informants emphasised that EFT cannot be applied by poor farmers, with the cost per tree at 100,000 to 150,000 of EFT per year. Another potential barrier mentioned in the qualitative interviews is the **additional workload** that comes along with applying the Early Flowering Technology; workload is perceived as high because smallholder farmers do not have extensive experience in cultivating mango and are not accustomed to working with mango trees. While costs are not particularly high compared to the cost of other crops, it is still considered a relatively large investment considering the risks and opportunity cost of manpower to manage trees and properly apply the technology; one of the dominant topics in the interviews.

Productivity perceptions is another barrier as the productivity of many mango trees generally has decreased in the past few years. The harvest of mango was very poor especially during the study year (2015), mainly due to the dry climate. Given this situation farmers are even more worried about taking risks to invest in mango. However if the farmer properly executes good pruning techniques, fertilising and proper GAP, lower productivity can be avoided according to the PRISMA team. These barriers to cultivating mango and using EFT can be overcome if the PRISMA team focuses on changing farmer perceptions of cost, opportunity cost relative to other crops, workload and manpower, and productivity.

Because of the marked barrier of farmer perceptions, the PRISMA team is actively planning social marketing campaigns to reach small holder farmers more efficiently, therefore intimately knowing where farmers go for information and the most trusted sources is vital. Farmers' personal networks (friends and neighbours) are the primary information sources according to the quantitative survey, followed by farmers groups. Collectors are the most trusted sources of information for mango prices, and extension workers are important sources of information on mango varieties, followed by agricultural input stores. The PRISMA team will have to focus on various channels of communication depending on what aspect of mango cultivation they are messaging. For example, farmer groups may be a target audience for Early Flowing Technology and GAP communications, while information on off-season pricing may be enhanced through better informing farmer groups and direct targeting of farmers. PRISMA should be aware of communicating price to smallholder farmers through collectors, as according to the team they have a business incentive to mark down the price quoted to farmers. However, collectors are overwhelmingly cited as a trusted source of information for farmers, and while it may be best to communicate price through more neutral sources, collectors play an important role in disseminating information about GAP and potentially applying EFT.

In terms of making the decision to use EFT technology, the advice of extension workers was the most dominate reason stated by farmers when deciding to apply EFT. The extension workers for mango are usually private sector extension workers from input providers such as a Syngenta agronomist. Government Extension workers in North Lombok are not very present and mango is not considered a priority commodity for the government. A partnership with the government encouraging support of the mango sector may greatly increase the likelihood that farmers will be equiped with mango cultivation knowledge, and potentially boost their income via exploting a neglected secondary crop. A higher mango productivity and higher selling prices are the main expected benefits from using EFT according to the sample, PRISMA should market these benefits and show success through farmer case studies and also trusted collector case studies.

Overall, the PRISMA intervention team has had to target small collectors in applying EFT technology, as these market actors are first movers, and smallholder farmers usually will only follow if they see success. While smallholder farmers have been taking up EFT and also benefit from both higher productivity of their own trees and higher rent prices if they are renting to collectors, in order to increase PRISMA's outreach, the intervention is currently in the stage of communicating success stories so that more risk adverse smallholder farmers follow. This report will be helpful to the team in both profiling the poorest smallholder farmers to target and identifying the key communication channels to reach these farmers.