



THE ECONOMICS OF CLOVE FARMING IN INDONESIA

Health, Population, and Nutrition
Global Practice



Cover photos (clockwise from left): Senior farmer standing in his farm. Photo by Jacob Ammentorp Lund / iStock. Beautiful Panoramic View of Gunung Batur Vlcano in Bali. Photo by AleksandarGeorgiev / iStock. Bag of Cloves. Photo by Bveth / iStock. Clove tree with spicy raw flowers and sticks. Photo by Bicho_raro / iStock.

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LIST OF ACRONYMS

APCI	Indonesia Clove Farmer Association
BPJS	National Health Insurance System
FAO	Food and Agriculture Organization's
HRW	Human Rights Watch
ILO	International Labour Organization
IAKMI	Indonesian Public Health Association
KIS	Indonesia Health Card
KKS	Family Welfare Card
KPS	Social Security Card
PPP	Purchasing Power Parity
USD	United States (US) Dollars

EXECUTIVE SUMMARY

Indonesia is the world's largest clove producer, cultivating more than 70% of the world's crop. The vast preponderance of Indonesia's annual clove harvest, around 90%, is purchased each year by the Indonesian tobacco industry to produce kreteks.

Many thousands of Indonesian households grow cloves, but it typically comprises only a small proportion of their total economic activity. Recent government data suggest that more than one million farmers grow cloves in Indonesia (IAKMI, p. 67). Given that clove production is a fraction of broader household production/resources of most clove-farming households and the labour involved in clove farming is intermittent and concentrated only at specific relatively brief times of the years (e.g., harvest), actual full-time equivalent employment is much smaller.

This report on the economics of clove farming is motivated by the recent evolution of the taxation of kreteks and other tobacco products in Indonesia. Over more than a decade, the Indonesian government has slowly been raising excise taxes on tobacco products. More recently, the government has considered reforming the excise tax structure even further by collapsing the number of tiers of taxation rates while also generally raising these rates. The government has articulated concern that these tax reforms, while mitigating consumption of a harmful product, could also affect the economic lives of those in the kretek value chain. Clove farmers are part of this value chain.

This report aims to inform the current debate over the taxation of kreteks in Indonesia by examining clove-farming livelihoods. It presents results from a comprehensive, household-level, economically-focused survey of 600 clove farmers across the two largest clove-growing regions, Sulawesi and Central Java. The survey examines the role that clove farming plays in these households' economic lives, among other related topics.

This report is part of the Indonesia Tobacco Employment Studies implemented by the World Bank and the American Cancer Society. The findings from this report complement the findings from three closely-related reports focusing on specific segments of tobacco sector employment in Indonesia: tobacco farmers (World Bank 2017b), kretek workers or "hand-rollers" (World Bank 2017c) and tobacco manufacturing more broadly (World Bank, 2017d).

The main findings of this report include:

- **Though hundreds of thousands of farmers grow cloves in Indonesia, tobacco tax reform is unlikely to cause a large economic disruption for most clove-growing households because more than half of households derived less than 20 percent of their income from cloves.** Clove farming is not the primary source of economic livelihood for most households that grow cloves;

- **Clove farming is not highly lucrative for many farmers, particularly in certain regions such as Minahasa.** After incorporating the costs of household labor, the average clove-farming household was losing more than two dollars per kilogram;
- **Individuals in clove-farming households in the survey were on average poorer than the average Indonesian household**—11.1 percent of Indonesians fall below the national poverty line compared to 37 percent of these clove-farming households;
- **A loss to a household from lower clove production should not be presumed because many clove-growing households with their varied economic activities are likely to be able to effectively reallocate factors of production** (including capital, land and/or labour) to other productive activities such as alternative crops or a small business;
 - **Land might be better allocated to more proven economically-lucrative pursuits**, particularly in places where there are clear viable options such as growing more of locally-grown cash crops (e.g., rice, corn, and green vegetables, among others).

Recommendations

In terms of considering what might happen if there were a change in tax policy that affected demand for Indonesian cloves, it is important to emphasize that clove farming is not particularly profitable for most clove-producing households in at least a couple of major clove-producing districts. The government needs to research which alternatives could be viable and target the least-profitable areas for switching and help these farmers make successful transitions to growing other crops and/or economic activities.

- In case of negative effects from higher tobacco taxes, the government could help clove farmers to identify other economically fruitful pursuits.
 - Research which alternative locally-grown crops are most viable on former clove-producing land;
 - Enhance supply and value chains for these alternative local crops;
- Support research to identify the areas where clove production is least viable (e.g., Minahasa) and target those areas for alternatives first;
- Improve agricultural extension services for non-clove crops;
- Provide educational grants for improving clove farmers' agricultural management skills;
- Improve access to credit for farmers to grow other crops or pursue other small economic enterprises such as a small shop, fish farming, or a local transportation business.
 - Provide grants or low-interest loans to farmers willing to switch to alternative crops; and
 - Introduce financial programs or economic development programs as forms of transition assistance away from clove cultivation.

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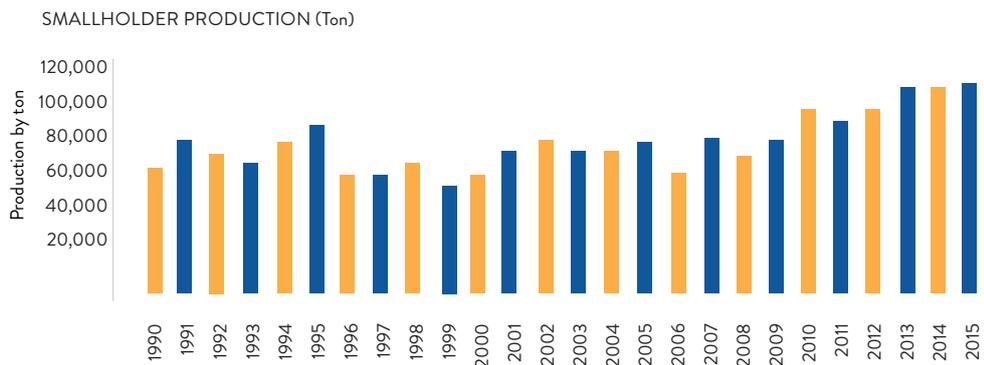
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INTRODUCTION

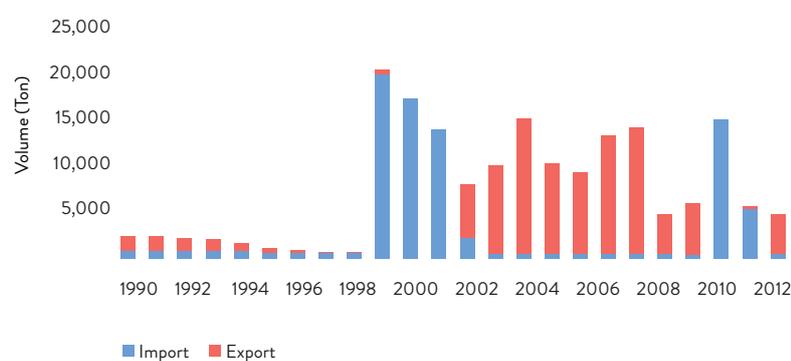
Indonesia is the largest producer of cloves in the world. The Food and Agriculture Organization's (FAO) most recent statistics on clove production (from 2013) report that Indonesia produced more than 70% of the world's cloves, largely by smallholder farmers (i.e., not plantations). In contrast, the next largest producer, Madagascar, produced ~16% of the world's cloves. Important to the broader inquiry of this research, the vast preponderance of Indonesia's annual clove harvest (usually ~100,000 metric tons)—typically around 90 percent—is purchased each year by the Indonesian tobacco industry to produce kreteks. Figure 1 shows smallholder (less than four hectares) production from 1990 to 2015 by ton.

Figure 1: Indonesia's Annual Smallholder Clove Production by Ton



Because of the large domestic demand for cloves, in most years, only a small proportion, ~5 percent, is exported. Occasionally, after a strong yield over one or more years, Indonesian clove exports increase. For example, in 2016, the UN trade statistics database reports that approximately 40% of the value of total world clove exports were from Indonesia, which was atypical. Inversely, in the occasional low yield year, clove imports have increased to meet domestic demand. See Figure 2 below to track trends in clove imports and exports from 1990 to 2013.

Figure 2: Indonesian Clove Exports and Imports, 1990–2013



The Indonesian clove crop is typically grown on around 500,000 hectares of land, though the monetary value of the crop fluctuates with price. In early 2016, the Indonesia Clove Farmer Association (APCI) estimated that the average price was around \$7.19/kg. The same association suggested that this was a profit margin of more than 25% for farmers. The results from the survey reported below do not match in terms of price—farmers consistently reported average lower prices.

Many thousands of Indonesian households grow cloves, but it typically comprises only a small proportion of their total economic activity. Though employment statistics are scarce, perhaps because growing cloves is only a small part of these households' economic activities, according to a recent report from the Indonesian Public Health Association (IAKMI, p. 67), the government reported that more than one million Indonesian individuals were contributing labour to growing cloves in 2012. It is critical to note—a dynamic supported strongly by the survey results presented in this report—that clove production is a fraction of broader household production/resources of most clove-farming households. Furthermore, clove farming is by nature very rarely the source of full-time employment for most of these individuals, since the labour involved in clove farming is intermittent and concentrated at specific times of the years, such as at harvest.

This report aims to inform the current debate over the taxation of kreteks in Indonesia. As the Indonesian government considers reforming its excise tax structure and rates, there have been concerns that these tax reforms could also affect the economic lives of those in the kretek value chain. Clove farmers are part of this value chain. Accordingly, in this report, we examine empirically the economic livelihoods of clove farmers in Indonesia, largely by analyzing the results of a comprehensive, household-level economically-focused survey of 600 clove farmers across the two largest clove-growing



regions, Sulawesi and Central Java. The survey examines the role that clove farming plays in these households' economic lives, among other related topics. This report is part of the Indonesia Tobacco Employment Studies implemented by the World Bank and the American Cancer Society. The findings from this report complements the findings from the other reports which focused on other specific segments of the tobacco sector employment in Indonesia, more specifically tobacco farmers (World Bank 2017b), kretek workers (World Bank 2017c) and tobacco manufacturing more broadly (World Bank, 2017d).

The report is structured as follows: the next section, section 2, presents a summary of survey methods and the analysis undertaken. Then the following section, section 3, presents the results of the analyses of the survey data. It begins with an examination of the socio-demographic characteristics of the households. Next, it tracks the economic situation of the households including their broad economic endeavors, costs of growing cloves, prices of and incomes from cloves, credit and debt to grow cloves, and alternatives to cloves. It also tracks household assets. The subsequent sections focus on specific issues, such as farmers' wellbeing, child labour, health and food security. The final sections, discusses limitations of the study and present conclusions, respectively.

2

METHODS

The report utilizes a household-level survey of a nationally representative sample of clove-producing households. To examine the economic livelihoods of clove-farming households in Indonesia, we developed a survey instrument derived in large part from previous surveys used to evaluate the economic livelihoods of tobacco farmers in Africa and Southeast Asia, and the World Bank's Living Standards Measurement Survey (see Chavez et al., 2016; Goma et al., 2015; Magati et al., 2016; Makoka et al., 2016; World Bank, 2017). The survey was particularly focused on collecting data on household economic activity, including all sources of clove-farming revenue and production. At the same time, it queried respondents comprehensively on the costs of running both their agricultural and non-agricultural businesses, including both hired and household labor, to provide a complete snapshot of each household's economic life.

To implement the survey, we purposively selected the two top clove-producing provinces, North Sulawesi and Central Java, which typically account for more than 70 percent of clove production. In each province, we selected the two highest-producing kabupaten (districts). In each kabupaten, we randomly selected one top-producing kecamatan (subdistrict) and one second-tier producing kecamatan. Within each selected kecamatan, we chose the three highest-producing villages. In each selected village, we selected the sub-village with the largest number of farmers according to the village informant. We went door to door to verify that the farmers listed were indeed current farmers. If we verified 50 farmers in the first sub-village, we stopped and used that list to draw our sample. If we could not find and verify 50 farmers, we went to the next sub-village to get the additional ones. From the sub-villages in which we could list 50 farmers, we randomly selected 25 to interview. A complete list of these districts and municipalities is available in the supplementary appendices available upon request. The report utilizes mainly thick, descriptive statistics of the survey results, but also utilizes causal analysis where appropriate, particularly for food security.

3 RESULTS

3.1 - Socio-Demographic Characteristics of Clove Farmers

Clover farmers' households are typically headed by married males, usually older than average and with an elementary school education or less. In Table 1, we present the basic socio-demographic characteristics of the heads of the clove-farming households—household heads were overwhelmingly male (95.5%) and married (88.2%). They tended to be older than the average population with 69% between 36 and 60 years of age (the average age in 2016 in Indonesia was 27), and another ~25% who were older than 60 years. The majority (~60%) had an elementary school education or less. More than two-thirds (69%) reported agriculture as their principal activity.

Table 1: Socio-Demographic Characteristics of Clove Farmers

	N = 600	PERCENT
GENDER		
Male	573	95.5
Female	27	4.5
AGE (YEARS)		
20-35	33	5.54
36-60	412	69.13
>60	151	25.34
MARITAL STATUS		
Never married	12	2.00
Married	529	88.17
Divorced/separated	11	1.83
Widowed	47	7.83
Living with partner	1	0.17
HOUSEHOLD SIZE BY AGE		
<21	418	1.71
21-35	294	1.44
36-60	527	1.74
>60	233	1.30

Table 1: Socio-Demographic Characteristics of Clove Farmers (CONT.)

	N = 600	PERCENT
EDUCATION		
Not yet/no schooling	29	4.83
Elementary school	332	55.33
Public junior high	107	17.83
Senior high school	78	13.00
Vocational school	22	3.67
College or above	32	5.33
MAIN ACTIVITY		
Agricultural work	414	69.00
Non-agricultural work	160	26.67
Home duties	4	0.67
Retired/aged	8	1.33
No work	14	2.33

Clove-farming households average four people. In Table 2, we present the size of clove-farming households. The median household size was four, typically with two people older than 36 years, one between 21 and 35, and then one who was younger than 21. Households were as few as one and as large as 10.

Table 2: Household Size by Age Group

	TOTAL	GENDER		AGE RANGE			
		F	M	<21	21-35	36-60	>60
Median	4	2	2	1	1	2	0
Minimum	1	0	0	0	0	0	0
Maximum	10	7	6	5	4	4	3

3.2 - Household Assets

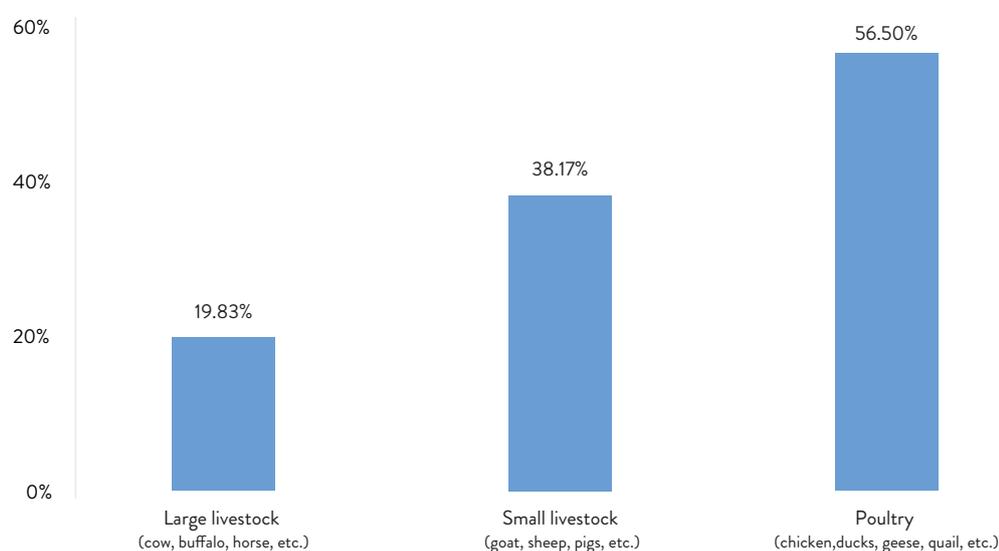
Most clove-farming households demonstrated some asset accumulation. For example, as presented in Table 3, approximately 90% of households reported having a TV and/or a mobile (cell) phone. More than three quarters of households owned at least one motorcycle. Nearly half of households had a VCR/DVD player or similar device.

Table 3: Household Assets

ITEM	OWNERSHIP
TV	91.50%
DVD/VCD player/home theater/radio tape	44.17%
Satellite disk	31.67%
Electric oven/microwave	2.67%
Refrigerator	46.00%
Liquefied petroleum gas tube (≥3 kg)	86.67%
Washing machine	25.50%
AC (air conditioner)	0.67%
Telephone (landline)	0.33%
Mobile (cellular) phone	88.67%
Computer/laptop	16.83%
Tablet	8.17%
Video camera (handycam)/camera	3.83%
Water heater	11.33%
Electric pump/jet pump	11.17%
Generator	16.50%
Vehicle	14.00%
Boat/motorboat	3.67%
Motorcycle	76.83%

Many clove farmers reported other agricultural assets, particularly poultry and/or small livestock. In Figure 3, we report on households' livestock assets. Slightly more than half of the clove-farming households reported owning chickens while nearly 40% indicated owning small livestock such as goats and sheep. Only approximately 20% reported owning large livestock such as buffalo, cows or horses, which is lower than for the general agricultural population which is approximately 40 percent according to the most recent Indonesia Family Life Survey (IFLS, 2016).

Figure 3: Livestock Assets



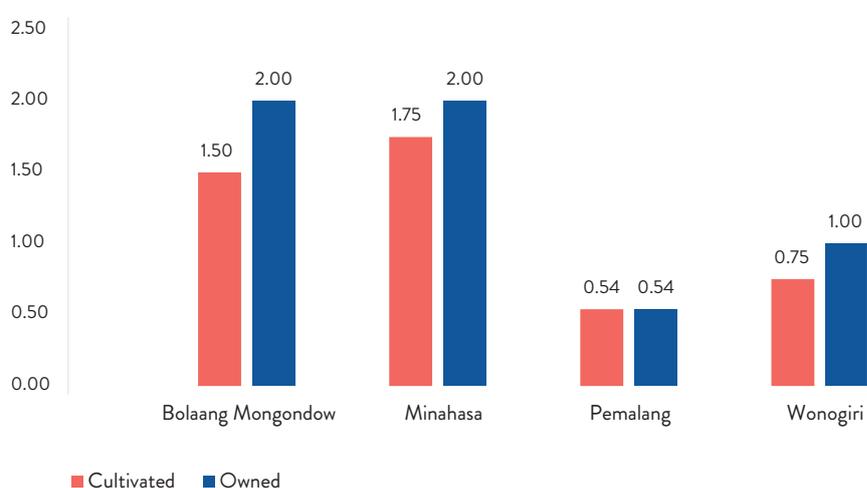
Most clove farmers reported a variety of non-livestock agricultural assets. In Table 4, we report clove farmers’ non-livestock agricultural assets. More than half (57%) of farmers reported owning a cangkul (a “hoe” in English) used to loosen earth, among other activities. More than one quarter of households reported owning a chopping machine that can chop raw agricultural products. Roughly one quarter of households reported owning a sabit (a “sickle” in English), which is a hand-held agricultural chopping implement. Very few households reported owning more expensive agricultural assets such as a pump, a plough or a tractor.

Table 4: Non-Livestock Agricultural Assets

ITEM	OWNERSHIP
Item	Ownership
Wagon	6.33%
Plough	0.50%
Tractor	1.83%
Water pump for farming	1.33%
Chopper machine	28.17%
Cangkul	56.67%
Sabit	25.33%

The total size of land of clove-farming households owned and cultivated for cloves varied within and across regions. As Figure 4 reports, the median size of the land plots owned and cultivated was generally much greater in Sulawesi. In Bolaang Mongondo and Minahasa, the median household owned 2 hectares. In Minahasa, they cultivated most of it (on average about 1.75 ha). In Bolaang Mongondow, farmers on average cultivated about three-quarters of their land. In Java, the median plot sizes were smaller, 1 hectare in Wonogiri and just over half of a hectare in Pemalang. In Pemalang, perhaps due to the small plot size, all farmers reported cultivating all of their cultivable land.

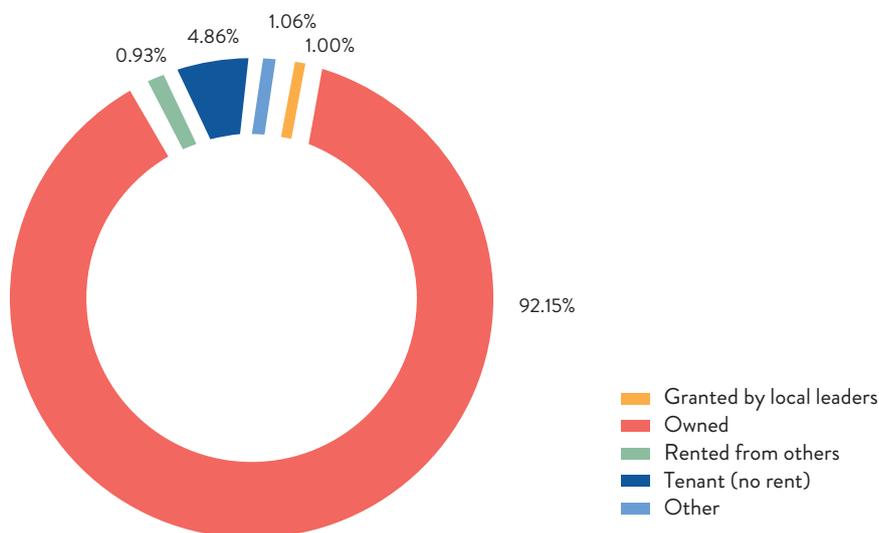
Figure 4: Total Land – Owned (hectares) & Under Cultivation



Most clove-farming households owned the land on which they are growing cloves.

As Figure 5 illustrates, households owned the vast majority, ~92%, of land parcels that they used to cultivate their cloves. Only 1% of the parcels were rented to grow cloves, while approximately 5% of the parcels were someone else's land but the farmers reported that they did not pay rent to grow cloves on the land.

Figure 5: Land Ownership



3.3 - Economic Livelihoods of Clove-Farming Households

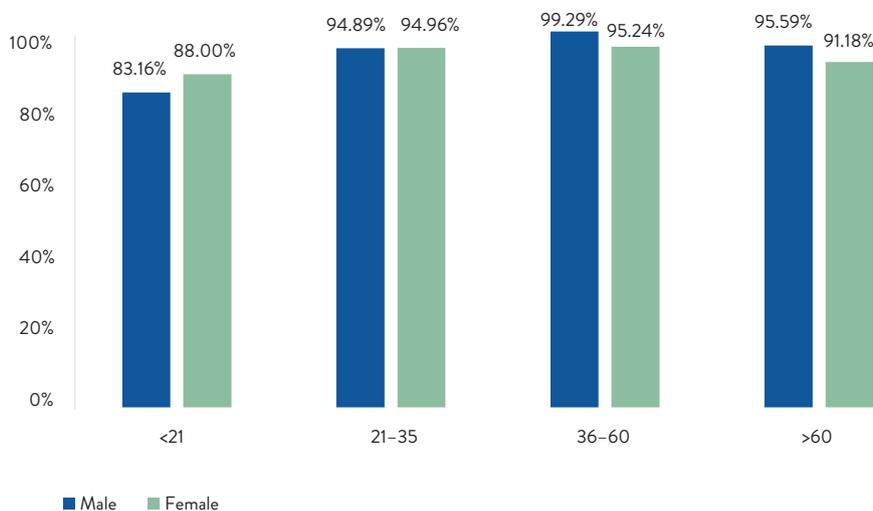
Clove-farming households demonstrated a wide variety of principal economic activity, but rarely actual clove farming. In terms of the reported main livelihoods of household members (all, head and otherwise), there was considerable heterogeneity, with no one category capturing more than 15% of the survey respondents. As Table 5 illustrates, agriculture was the largest represented sector. Clove farming comprised 15 percent of those respondents who answered the question, as did non-clove farming.

Clove farming is not the primary source of economic livelihood for most households that grow cloves. In the column on the farthest right, the table reports the average daily income of individuals from the survey working in that sector and the average number of months worked in that sector in the previous 12 months. Individuals reporting clove farming as the main source of livelihood averaged \$7.93 per day in daily income, which was slightly above the average of all survey respondents, \$7.32. However, on average, respondents worked fewer than four months at clove farming. Respondents reporting non-clove agriculture as a main livelihood generated an average of \$4.77 per day from this activity. Importantly, many of these activities were not full time (perhaps especially some agricultural activities), which must be considered, particularly when evaluating/comparing these values across sectors (for a version of Table 5 for all household members, please see the online appendix).

Table 5: Main Source of Livelihood

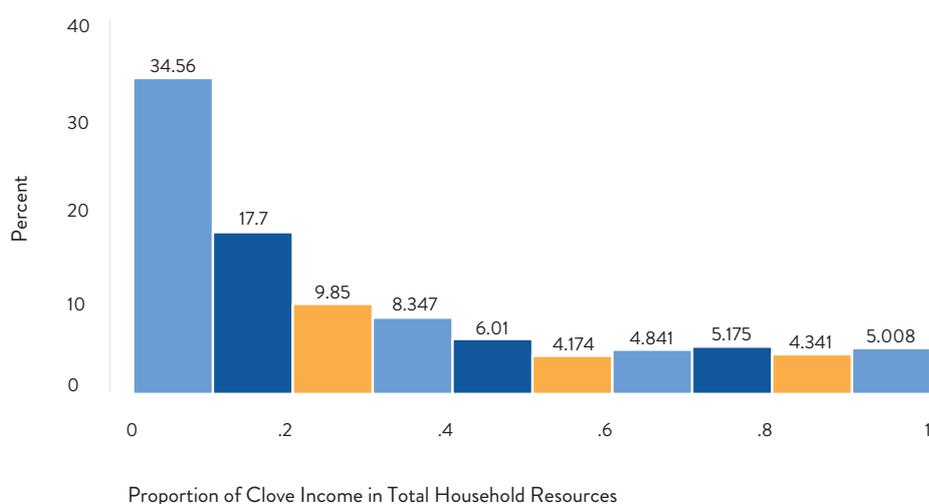
	N	PERCENT	AVERAGE DAILY WAGE (IN USD)	AVERAGE MONTHS WORKED FOR LAST 12 MONTHS
Agriculture: clove	95	14.68	7.93	3.79
Agriculture: non-clove	97	14.99	4.77	4.00
Forestry; animal husbandry; fishing;	70	10.82	5.09	5.44
Mining and quarry	27	4.17	12.13	6.11
Electricity; gas; water (utilities)	6	0.93	8.03	7.50
Construction/building	87	13.45	9.52	4.36
Transport; storage; communications	24	3.71	7.15	8.00
Financial services; real estate; lease	5	0.77	8.49	9.00
Restaurant; food sale	16	2.47	4.67	5.38
Industry: food processing/production	4	0.62	3.49	6.25
Industry: clothing	6	0.93	5.10	7.50
Industry: other	9	1.39	13.49	5.89
Sales: nonfood	11	1.70	6.44	6.27
Service: government	60	9.27	7.05	10.30
Service: teacher	50	7.73	5.61	11.22
Service: professional	17	2.63	7.29	7.12
Service: transportation	5	0.77	7.27	6.80
Service: other	48	7.42	5.81	6.49
Other	10	1.55	3.64	7.10
Total	647	100	7.32	6.11

Figure 6: Clove Farming Participation by Age and Gender



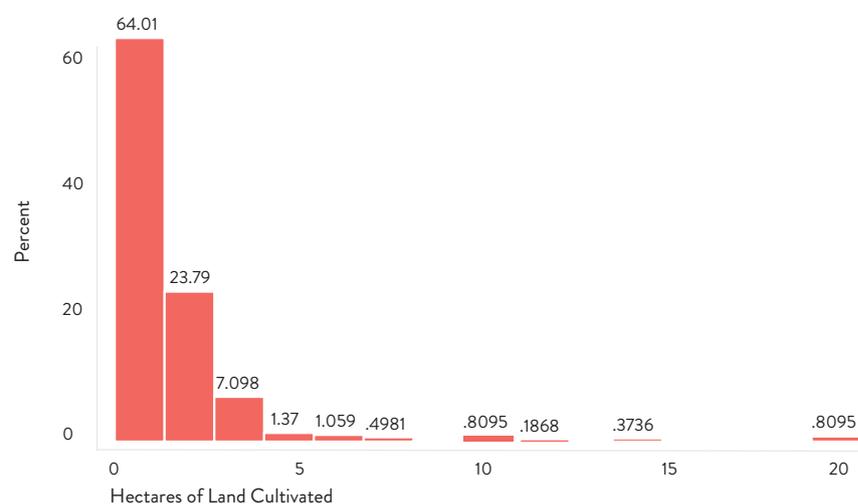
Most members of clove-farming households participated in clove farming, though it was usually a small proportion of their total economic activity. In Figure 6, we report the percentage of all adult household members who indicated participating at some point in the previous year in clove production. Across all age categories, participation rates in clove farming were very high. Thus, though only a small proportion reported clove farming as a main activity, it was an activity for most individuals living in the surveyed households.

Figure 7: Proportion of Total Household Resources from Clove Farming Income



Most clove-farming households are cultivating cloves as a secondary economic pursuit. In Figure 7, we examine the proportion of total household resources generated by farming cloves. The results demonstrate that more than half of these clove-farming households generated less than 20% of their total household resources from clove farming. At the same time, less than a quarter of the clove-farming households in the survey generated more than half of their overall resources from clove farming. The nature of cloves as a relatively low-maintenance perennial plant reasonably lends itself to this dynamic, though there are bursts of more labor-intensive activity during the year, particularly at harvest and postharvest times.

Figure 8: Land Size Dedicated to Clove Cultivation by Hectare



Most households—nearly two-thirds—reported cultivating less than one quarter of a hectare of land to grow cloves. In Figure 8, we present the number of hectares that the surveyed households dedicated to clove farming. There are two caveats to this finding in that we observed that many farmers had difficulty assigning the size of the land for clove trees because they were above the ground. Also, some farmers reported using some of the land under the canopy of the clove trees for other productive agricultural purposes (i.e., growing other crops).

Clove farmers reported growing a wide variety of crops, which varied by region. The survey also asked about all the crops the households were cultivating across all growing seasons. In many districts, respondents reported three growing seasons. As reported in Table 6, there was significant variation among regions. For example, in Pemalang and Wonogiri, cassava was relatively widespread (46.7% and 44% respectively). In Pemalang, 56.7 percent of farmers reported growing bananas, and another 44.7 percent reported cultivating bamboo or wood. In Wonogiri, 71.3% reported growing paddy (rice). In general, clove-farming households in Bolaang Mongondow Timur and Minahasa reported growing a smaller variety of crops beyond cloves.

Table 6: Frequencies of Households by Crop Cultivation by Region—All Seasons

	BOLAANG MONGONDOW	MINAHASA	PEMALANG	WONOGIRI	TOTAL
Cassava	3	12	70	66	151
Sweet potato	0	7	22	9	38
Ground nut	1	1	1	3	6
Cashew/other nut	1	5	0		6
Corn	7	25	37	23	92
Chili	26	19	37	1	83
Shallot	1	0	2	0	3
Coconut	30	36	15	6	87
Banana	31	33	85	13	162
Spices	11	15	36	91	153
Green vegetables	6	6	20	0	32
Other vegetables	1	3	13	5	22
Clove	150	150	150	150	600
Fruits	5	23	22	1	51
Paddy	1	7	55	107	170
Wood/bamboo	20	40	67	79	206
Tea/coffee/ chocolate	51	1	47	6	105
Other	0	1	9	16	26

3.4 – Costs of Clove Cultivation

Mean and per kilogram nonlabour costs varied by region. In Tables 7 and 8, we examine mean and per kilogram nonlabour costs. The average costs varied among regions and major categories of expenses (depreciation of equipment, inputs, interest, levies and land rental). On average, households spent \$231.76 on clove farming. Physical inputs (e.g., fertilizer, pesticides, equipment, etc.) were typically the largest cost both per kg, but also varied, from 0.35/kg in Wongiri to \$1.69/kg in Bolaang Mongondow. Rent was only a large cost in Bolaang Mongondow (\$3.37/kg). The other major cost in at least two regions was interest on loans—\$0.66/kg in Minahasa and \$0.50 in Pemalang. We also calculated costs per hectare but we found the calculations fundamentally problematic because farmers have difficulty assigning a value to the size of the land dedicated to clove farming.

Table 7: Mean Nonlabour Costs by Region in USD

DISTRICT	DEPRECIATION	INPUT COST	INTEREST COST	LEVIES	RENT	TOTAL
Bolaang Mongondow	18.27	95.08	118.89	4.15	337.41	237.37
Minahasa	10.28	198.11	220.40	6.46	4.50	428.49
Pemalang	6.76	55.17	73.62	0.54	269.92	131.78
Wonogiri	11.67	46.18	72.67	0.36	749.79	130.03
Total	11.74	99.28	121.39	2.88	340.41	231.76

Table 8: Per Kilogram Nonlabour by Region in USD

DISTRICT	DEPRECIATION	INPUT COST	INTEREST COST	LEVIES	RENT	TOTAL
Bolaang Mongondow	0.57	1.69	0.38	0.45	3.37	6.04
Minahasa	0.30	1.43	0.66	0.02	.	39.82
Pemalang	0.10	0.55	0.50	0.00	.	1.09
Wonogiri	0.25	0.35	0.27	0.00	.	1.35
Total	0.32	1.05	0.44	0.13	3.37	12.78

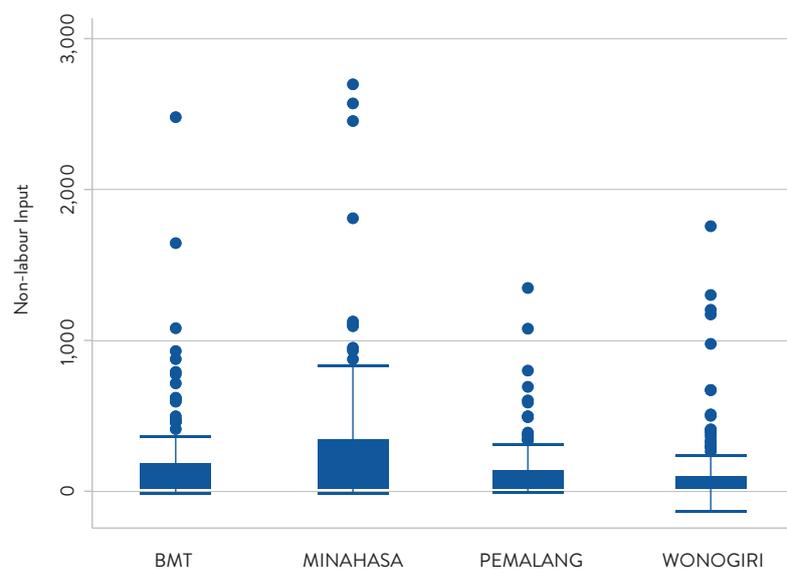
Fertilizer, fuel and/or transportation were the most common costs associated with clove farming. Table 9 reports in further detail on the physical (i.e., nonlabour) inputs that clove farmers reported using. In total, the average per household dollar amount spent on clove inputs was \$99.21. Almost all (93%) farmers reported buying a sickle and nearly two-thirds indicated purchasing bamboo sticks. Nearly 60% reported paying in some way to transport their cloves to market. Most clove farmers bought fertilizers, both nonorganic (56%) and organic (50%). Half of farmers purchased gasoline for vehicles and equipment related to clove farming activities. The highest average cost of a widely-used input was nonorganic fertilizer at \$58.79. The average cost of equipment rental was higher (\$85.13), but only 12 percent of farmers reported such a cost.

Table 9: Clove Farming Principal Inputs and Corresponding Costs (annual)

INPUT	PROPORTION OF FARMERS WHO USED INPUT	AVERAGE COST (USD)
Fertilizer nonorganic	56.17%	58.79
Fertilizer	49.83%	21.45
Pesticides (chemicals)	35.50%	13.31
Gasoline for clove farming equipment	49.50%	47.48
Oil	25.00%	5.31
Firewood/fuel wood	4.17%	.
Bamboo, bamboo sticks, rice hay, descuke-ride	63.67%	.
Knapsack sprayer	52.67%	.
Drums	14.00%	.
Sprinkler	18.83%	46.64
Rental of equipment/live-stock	12.00%	85.13
Transportation (to market)	59.17%	.
Water pump	2.50%	.
Mattock, sickle	93.00%	.
Others	47.00%	24.30

Most clove farmers reported total nonlabour costs of less than \$200. Figure 9 is a graphical representation of the distribution of average costs related to clove farming by region. Across all four regions, we can observe that most households report clove-related, nonlabour input costs below \$200 per year, which was comparable to the mean costs of the tobacco farmers from the companion survey.

Figure 9: Distribution of Nonlabour Costs in USD



Older household members were likelier to dedicate the most hours to clove farming. The survey queried respondents about the number of hours of labour the individuals in the survey dedicated to cultivating their cloves. On average, households dedicated an average of 479 hours per year to clove cultivation. Figure 10 demonstrates that male household members spend about 281 hours on average, with particularly older men expending more hours, on clove farming. The less physically-intensive nature of this work—mainly pruning, weeding, and watering compared to ploughing and other laborious field preparation—may help to explain this finding. For example, men older than 60 years spent on average 332 hours, while those between 21 and 35 spent 195 hours. Women spent fewer hours than men, on average about 170 hours, and with the same pattern that older women dedicated more hours than younger women.

The total value of labour varied by age and sex with the labour of men older than 36 years demonstrating the highest value. In Figure 11, we report the average labour costs of household members. We calculated the value of the labour by first establishing the district-level agricultural minimum wage (Government of Indonesia, 2016), then converted the number of total hours into the appropriate units (e.g., day, week, month, etc.) and multiplied by the wage rate. The value of labour for men older than 60 was the highest at approximately \$260 for the year.

Figure 10: Clove-Farming Household Labour Hours by Gender and Age

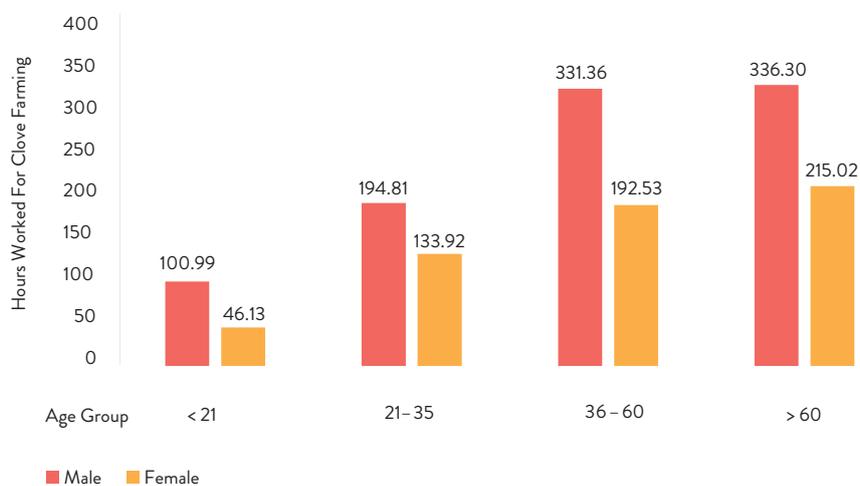
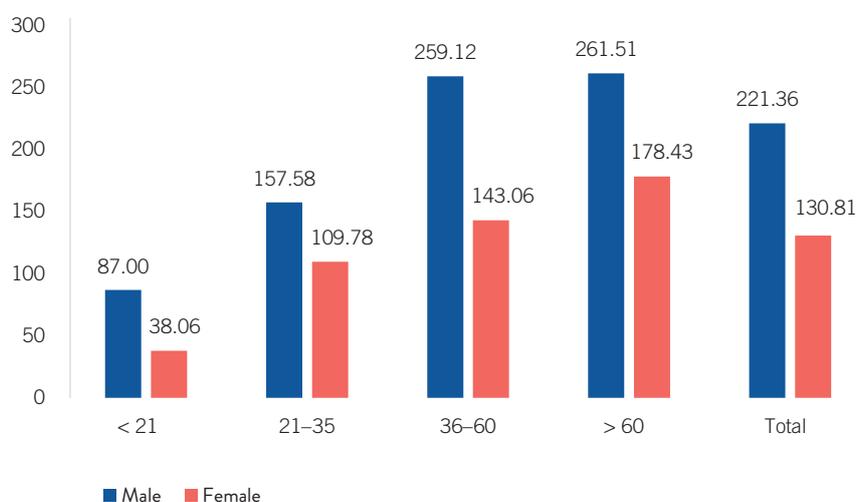


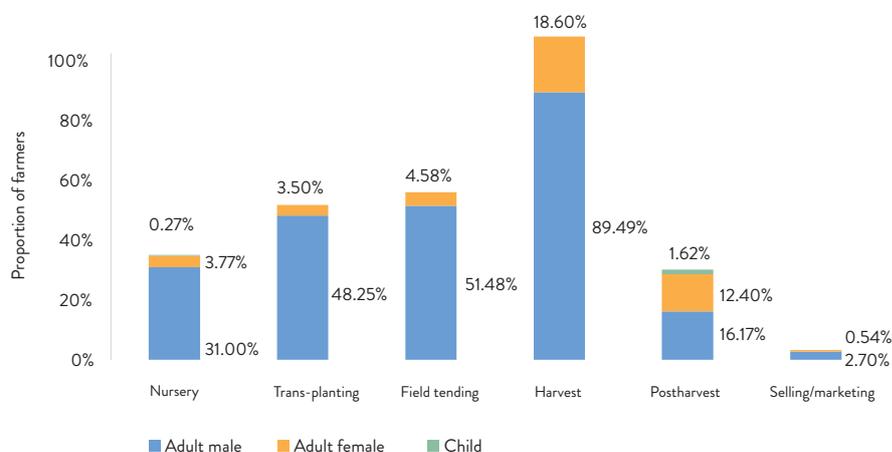
Figure 11: Clove Farming Labour Cost by Gender and Age (in USD)



Most clove farmers hired some external seasonal workers, particularly for harvest.

The results presented in Figure 12 demonstrate that many clove-farming households hired laborers to help with clove cultivation. It was particularly common for households to hire help during the harvest season. Nearly 90 percent of households hired men to work in this season, while nearly 19 percent hired women.

Figure 12: Percentage of Households Hiring Men and/or Women to Cultivate Cloves



The amount of hired labour varies widely across regions. Table 10 furnishes more information about hired labour. The total number of hours varies by region with farmers in Minahasa hiring for the most hours at 354. As illustrated in Table 11, farmers were more likely to hire men. On average, a hired male laborer will work 135 hours at harvest time, significantly more than the average hired woman (57 hours). Field tending is the next most labor-intensive activity with hired men laborers averaging nearly 67 hours and hired women laborers 98 hours. The postharvest hours for child labourers is a potential issue and is explored in a later section of the report.

Table 10: Average Hours of Hired Labour per Household by Region

DISTRICT	TOTAL LABOUR HOURS
Bolaang Mongondow	139.99
Minahasa	354.28
Pemalang	143.00
Wonogiri	69.07
Total	203.67

Table 11: Average Hours of Hired Labour by Gender

	NURSERY	TRANS-PLANTING	FIELD TENDING	HARVEST	POST-HARVEST	SELLING/MARKETING
Adult male	13.81	25.45	66.61	135.73	46.78	4.30
Adult female	13.14	22.62	98.29	57.12	44.07	2.00
Child	0.00	.	.	44.25	80.83	.
Total	13.63	25.26	69.20	121.43	47.49	3.92

3.5 - Clove Prices and Income

There is significant variation in the price of cloves depending on the variety and grade. For example, Table 12 reports that white cloves earned the lowest prices with Grade A White cloves earning on average \$3.27/kg. In contrast, Sikotok and Zazibar Grade A cloves earned nearly \$6/kg. Notably, Sikotok Grades B and C cloves earn about the same, while lower quality Zanzibar cloves earn significantly less. Note that none of these prices matches the \$7.19/kg estimate of the Indonesia Clove Farmers Association.

Table 12: Average Price per Kilogram by Grade and Type (USD)

Grade	TYPE			
	White	Sikotok	Ambonese	Zazibar
A	3.27	5.89	4.11	5.92
B	2.81	5.82	4.65	4.62
C	2.04	6.37		2.89
D	1.97			3.05
W	2.42	2.10	2.80	2.36
Total	2.91	5.43	3.87	5.30

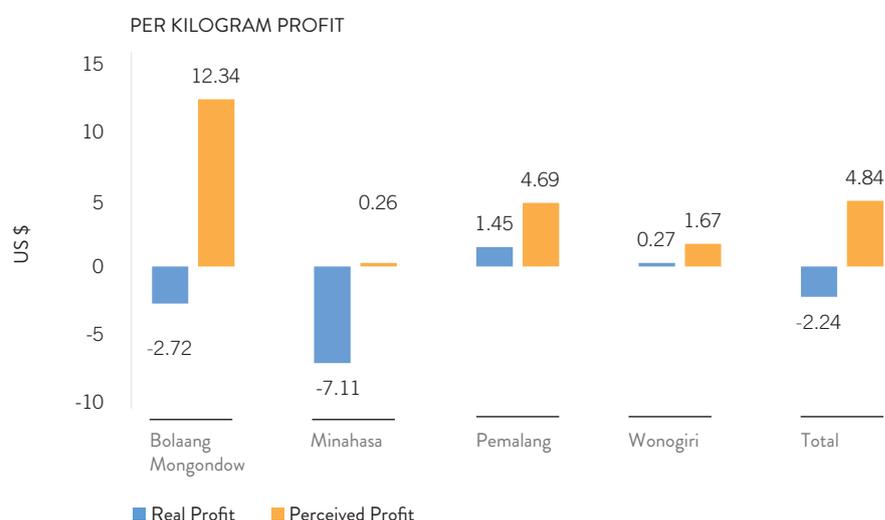
There was wide variation in clove prices and income reported, both within and across regions. The survey asked each household to report on average clove production, price and income. As Table 13 suggests, average clove production varied considerably, from 203.61 kg in Minahasa to 320.72 kg in Pematang. The average price received by the farmers depended on the type of clove and varied among regions. The cloves grown on Sulawesi (Bolnang Mongondow and Minahasa) are typically of the Zanzibar variety and fetched higher average prices—between \$6.50/kg and \$7/kg USD—than in Central Java where farmers in Pematang received an average price of \$3.14/kg and those in Wonogiri, \$1.96/kg. In Central Java, farmers grew both white clove and Zanzibar clove (and at least a couple of other types, too). Partly because of price (and total cultivation per household), average income from cloves ranged widely among the districts from \$439.13 in Wonogiri to \$2,575.72 in Minahasa. Another variable that affected price was whether the farmer sold the clove bud dry or wet. Dry bud—more common in Sulawesi—typically fetched a higher price.

Table 13: Average Clove Production, Price and Income

DISTRICT	QUANTITY OF CLOVE (KG)	AVERAGE PRICE (USD)	REPORTED ANNUAL CLOVE INCOME (USD)
Bolaang Mongondow	249.56	6.52	1,665.54
Minahasa	203.61	6.73	2,575.72
Pemalang	320.72	3.14	778.44
Wonogiri	254.10	1.96	439.13
All	251.02	4.69	1,364.71

Profits from clove cultivation varied widely by district. In Figure 13, we examine the profits per kilogram by region. The red bars indicate profits in terms of “perceived” profits or what most agricultural economists would term “gross margins,” which is the gross revenues from selling cloves less the direct costs incurred to grow them including physical inputs (e.g., fertilizer and pesticide), hired labour, marketing expenses and transportation. The blue bars represent what we term “realized profits” because they assign a value to the household labor dedicated to clove cultivation. We determine this value using the regional agricultural minimum wage. Overall, we observe that the average profit per kg using the gross margin method was \$4.84. This was driven in large part by the high prices paid to clove farmers in Bolaang Mongondow where the gross margin was \$12.34/kg. The lowest gross margin was in Minahasa where it was \$0.26/kg. In the blue columns, we incorporate the value of labour in the cost calculations. Overall, we find that average realized profits from cultivating cloves were negative for the surveyed households at –2.24/kg. We find that Pemalang is the most profitable at \$1.45/kg, while Bolaang Mongondow is the least profitable at –\$2.72. Considering this district’s higher average prices, labour costs for clove cultivation are clearly very high in this area.

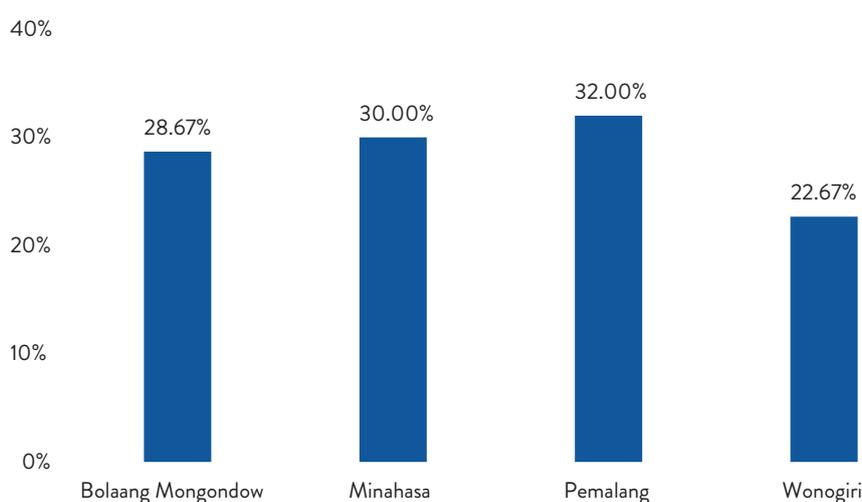
Figure 13: Profits per Kilogram—Real and Perceived—by Region



3.6 - Credit and Debt

Less than one-third of clove farmers sought credit to cultivate cloves. In Figure 14, we report the number of survey respondents who were seeking credit—ostensibly—to grow cloves. We find that the proportion never exceeds one-third and drops as low as 22.7% in Wonogiri. It appears that clove farming is not an economic activity that farmers commonly seek credit to pursue.

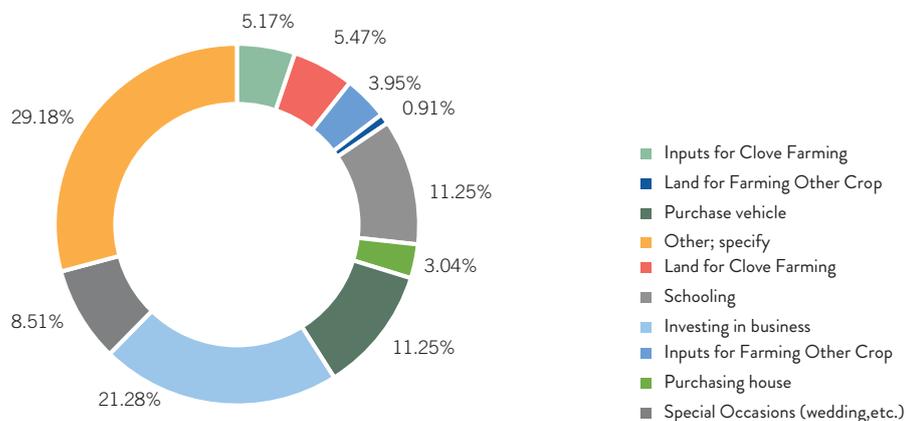
Figure 14: Demand for Credit by Region



Clove farmers typically reported seeking credit for broader business and household reasons than to support clove production directly. Figure 15 illustrates why some of the clove farmers are borrowing money and suggests that many of the reasons that they borrow do not pertain to actual clove farming. The most common explanation for borrowing money was a rather general explanation of “investing” in their clove-farming business (21.3%). But, the two next most common explanations were not farming-related: to pay for school fees (11.3%) or to purchase a vehicle (11.3%). These findings are similar to patterns with tobacco farmers in the Philippine (Briones, 2013; Chavez et al., 2016) and Sub-Saharan Africa (Goma et al., 2015; Magati et al., 2016; Makoka et al., 2016). Notably, only five percent mentioned that they wanted to borrow to pay for the inputs to cultivate cloves.

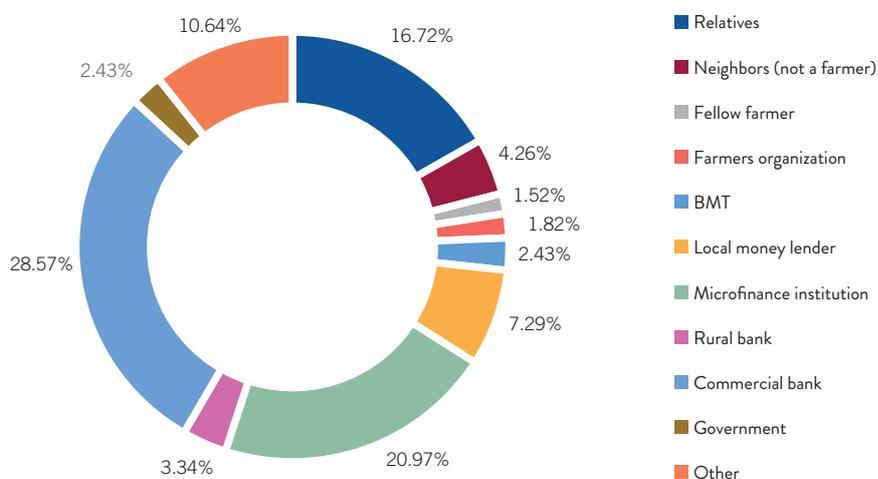
Figure 15: Why Farmers Borrow

PRIMARY USE OF LOAN



Clove farmers most typically borrowed from commercial banks or microfinance institutions. In Figure 16, we examine the sources of clove farmers' loans. The most common source of credit was commercial banks (28.5%). The next most common source of credit was microfinance institutions (21%). The third most common source of credit was from relatives (16.7%). In a related dynamic, we found that 33 households were under contract to sell their cloves to a buyer. In seven of those cases, the buyer had provided them with inputs such as fertilizer, which was then deducted from the sales to that buyer; notably, none of these farmers reported this as a loan even though it effectively was because, on average, they paid above market prices for these inputs.

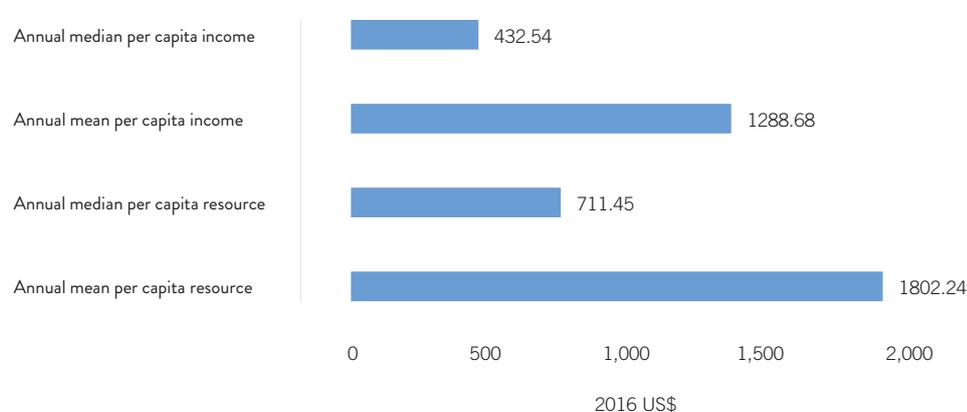
Figure 16: Who Clove Farmers Owe



3.7 – Household Economic Situation

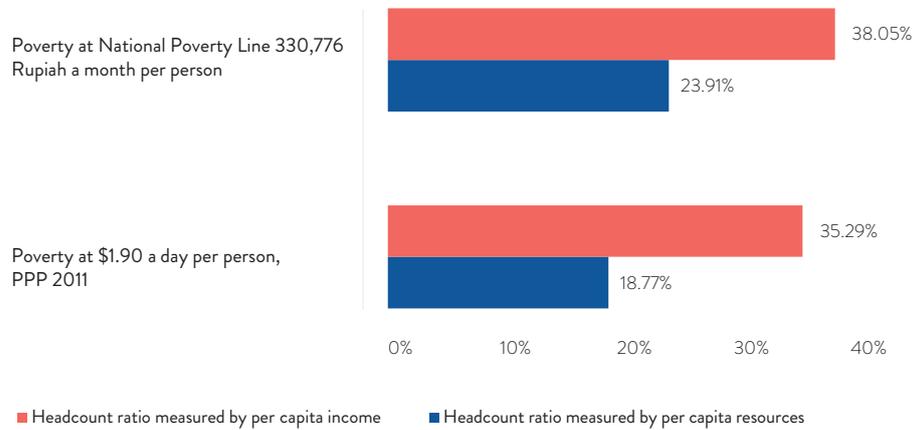
We generate and compare per household median and mean resources and incomes of clove-farming households. As presented in Figure 17, we calculated each household's total resources, which includes all revenues and other production (e.g., food cultivated and consumed), and generated a per household measure. Similarly, we calculated household income, which was resources less all expenses incurred by the household to produce the goods/services (either sold or consumed).

Figure 17: Per Capita Resources and Incomes of Clove-Farming Households



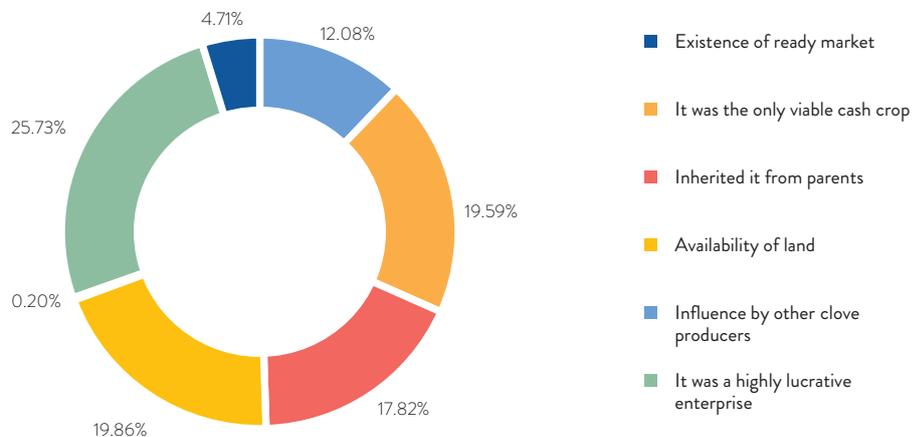
Poverty among clove-farming households is widespread. In Indonesia, generally, 8.3% of households fall below the World Bank poverty rate of \$1.90/day (PPP), while 11.1% fall under the Indonesian government's poverty line of ~\$22.60 USD per month. In Figure 18, we illustrate the proportion of clove-farming households that fall below these poverty lines. Using the measure of household total resources, which does not incorporate any agricultural or other business costs, the poverty rate for clove-farming households is 16.5% at the World Bank threshold and 21.83% at the Indonesian government threshold. When we use the more realistic measure of household total income, which subtracts all of the expenses incurred to farm or to run other household businesses from total resources, the poverty rate of clove-farming households increases to 34.17% at the World Bank line and 37% at the official government line.

Figure 18: Poverty Status of Clove-Farming Households



Farmers provide a variety of explanations for choosing clove farming. The challenging economic situations described above reasonably beg the question: why do clove farmers choose to cultivate this crop? As Figure 19 shows, the most common reason—given by just over a quarter of survey respondents—is that clove farming is lucrative. The results above from Bolaang Mongondow support this perspective. About 20% of respondents indicated that it was the only viable cash crop while another 20% reported that it had more to do with the availability of land to cultivate cloves. In order to determine how accurate their perception was, we cross-referenced perception and reality and those who identified clove farming as lucrative (either as a primary or “ever mentioned” reason) were not any more profitable (either per kilogram or per hectare) on average than those who did not identify it as lucrative. One weakness is individuals may define lucrative differently.

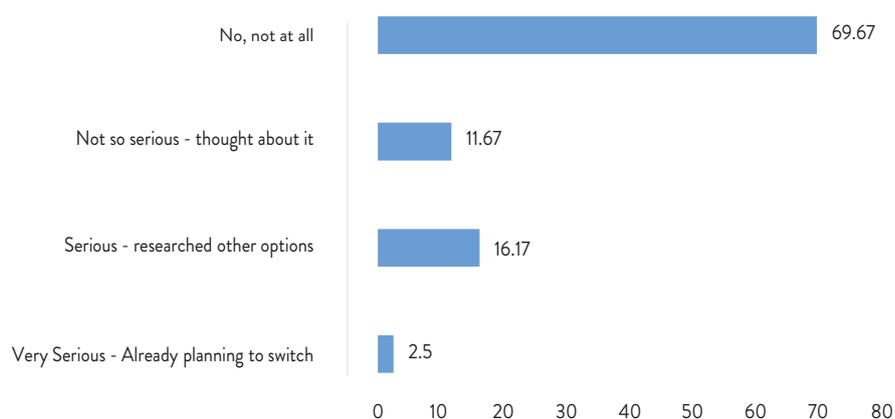
Figure 19: Reasons for Engaging in Clove Farming



3.8 - Alternative Livelihood Options

Most clove farmers were not considering alternatives to clove farming. As Figure 20 illustrates, nearly 70 percent of clove farmers were not considering switching. Less than 20 percent of farmers indicated being serious or very serious about switching to an alternative livelihood.

Figure 20: Percentage of Clove Farmers Considering Alternatives



We also used logistic regression to examine which farmers were willing to try alternatives to clove farming. The survey inquired about the possibility of farmers switching from clove cultivation to another crop. Some farmers indicated a willingness to switch, a process that has been happening involuntarily in some parts of the country due to challenges with clove disease and insect infestations (Rachman, 2016). In Table 14 we present the results from a logistic regression. The dependent variable is dichotomous with a “1” value representing those who are actively switching their clove crops to some extent already or have thought recently about switching. We used the previous literature on switching from tobacco growing as a starting point (e.g., Chavez et al., 2016; Goma et al., 2015; Magati et al., 2016; Makoka et al., 2016), and then used machine-learning methods and stepwise regression to further identify relevant independent variables from the survey results.

Farmers who farm fewer cloves or who have larger agricultural enterprises were the most willing to switch away from cloves. We report only the statistically significant coefficients in the table, though all the foundational analyses are available in our online appendices. We found that clove farmers who cultivated smaller amounts of land for cloves are more likely to be willing to switch from cloves to another crop. Farmers who cultivate more land in general are also more likely to be willing to switch – perhaps because they have flexibility to hedge each season and grow different crops and/or they

Table 14: Logistic Regression of Willingness to Switch

VARIABLES	COMPLETE CASE	IMPUTED MISSING
Hectares of land for clove farming	-2.520** (1.029)	
Hectares of land cultivated	2.655*** (0.627)	
Nonlabour income (\$100)	0.0774* (0.0431)	
Non-clove crop sales (\$100)	0.218* -0.114	0.0832*** (0.0247)
Clove sales (\$100)		-0.0739*** (0.0229)
Depreciation (\$100)		0.424** (0.171)
Hired labour cost for clove (\$100)		0.0922*** (0.0262)
Input cost for clove (\$100)	0.725*** (0.255)	0.282*** (0.109)
Cost of interest (\$100)	-3.610*** (1.021)	-0.954*** (0.230)
Hired labour cost for non-clove crops (\$100)	-0.239*** (0.0752)	
Nonagricultural household enterprises income (\$100)	0.00585* (0.00301)	0.00516*** (0.00133)
nonagricultural household enterprises cost (\$100)	-0.101** (0.0488)	-0.0850*** (0.0260)
Observations	254	600
Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1		

have more experience cultivating other crops. Similarly, farmers who already make more money selling crops other than cloves are more likely to be willing to switch. Farmers who had successful non-agricultural enterprises (and low-cost ones) were also more willing to quit. If the government wishes to move farmers away from clove production to decrease supply, this analysis gives several reasonable starting points in terms of whom to target.

4

HOUSEHOLD WELL-BEING

4.1 — Asset to Social Safety Nets

Nearly half of clove farming households in the survey received a social assistance benefit. In Table 15, we examine the proportion of households receiving social protection. We observe first that the total percentage of the surveyed households that received benefits either under a Social Security Card (KPS) or a Family Welfare Card (KKS) was just under 15 percent. In terms of a cash assistance/transfer, 3.7 percent of the total surveyed households received this benefit and had a KPS/KKS card. Another 1 percent of the surveyed households received this benefit but did not have the card. The largest benefit received by these farmers was through the rice for the poor program: 11.7 percent of surveyed households were receiving the rice benefit and had a KPS/KKS, while another 31.7 percent of households were receiving the benefit and did not have a card. Rates of receiving the other two major benefits—health and education assistance—were fairly similar to the cash assistance rates. These rates were below national averages—nearly a quarter of Indonesians are eligible for KKS and nearly 70 percent of households receive “rice for the poor” benefits.

Enrollments in government health programs were higher among clove farmers than in the general population. As shown in Table 16, approximately 16 percent of individuals in clove-farming households were beneficiaries of KIS while approximately 13 percent benefits from BPJS. Enrollment in each program nationwide is about 10 percent.

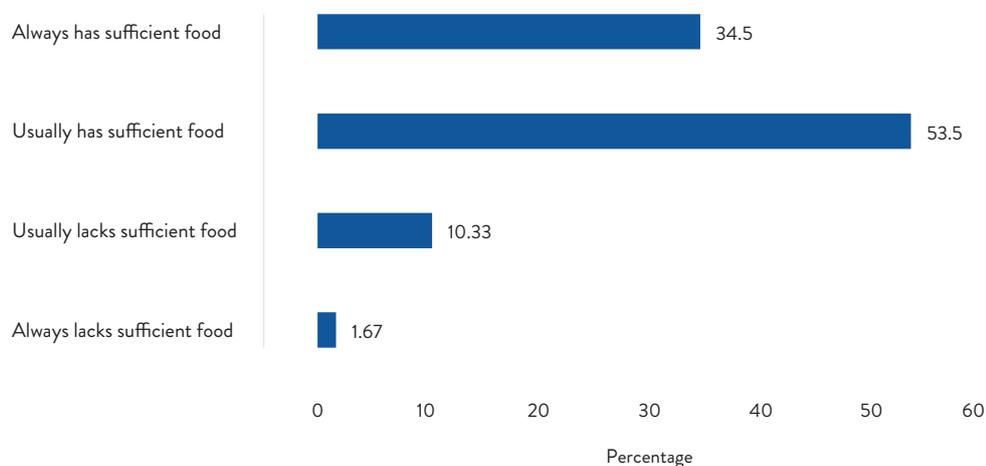
Table 15: KPS and KKS Participation

INDICATORS	STATUS OF CLOVE FARMERS' HOUSEHOLDS
Percentage of households who have KPS/KKS	14.67%
BENEFIT 1: PERCENTAGE OF HOUSEHOLDS WHO RECEIVED CASH ASSISTANCE/ TRANSFER IN LAST YEAR	
With KPS/KKS	3.67%
Not with KPS/KKS	1.00%
BENEFIT 2: PERCENTAGE OF HOUSEHOLDS WHO RECEIVED RICE FOR THE POOR (RASKIN) IN LAST YEAR	
With KPS/KKS	11.67%
Not with KPS/KKS	31.67%
BENEFIT 3: PERCENTAGE OF HOUSEHOLDS WHO RECEIVED ASSISTANCE FOR HEALTH PAYMENT IN LAST YEAR	
With KPS/KKS	2.50%
Not with KPS/KKS	3.00%
BENEFIT 4: PERCENTAGE OF HOUSEHOLDS WHO RECEIVED ASSISTANCE FOR POOR STUDENT IN LAST YEAR	
With KPS/KKS	3.33%
Not with KPS/KKS	2.83%
OVERALL PERCENTAGE OF HOUSEHOLDS WHO RECEIVED ASSISTANCE FROM KPS/ KKS OR OTHER SOURCES IN LAST YEAR	
One benefit	36.67%
Two benefits	8.50%
Three benefits	2.00%
Total	47.17%

Table 16: Participation in Indonesia Health Card (KIS) and National Health Insurance System (BPJS)

INDICATORS	STATUS OF CLOVE FARMERS' HOUSEHOLDS
PERCENTAGE OF HOUSEHOLDS WHO HAVE KIS/BPJS-PBI	
KIS	16.17%
BPJS-PBI	13.17%
Both KIS and BPJS-KIS	0.67%
None	71.33%
Percentage of households who have KIS and used it in last year	0.53%
PERCENTAGE OF HOUSEHOLDS WITH VOLUNTARY BPJS (BPJS SUKARELA/JKN)	
Plus KIS	0.67%
Plus BPJS-PBI	1.33%
Plus both KIS and BPJS-PBI	0.00%
Only voluntary BPJS	16.83%
None	81.17%
PERCENTAGE OF HOUSEHOLDS WHO HAVE VOLUNTARY BPJS AND USED IT IN LAST YEAR AVERAGE NUMBER OF HOUSEHOLD MEMBERS WHO OWN	
KIS	2.78
BPJS-PBI	2.75
Voluntary BPJS	2.77

Figure 21: Access to Sufficient Food



4.2 – Food Security

Most clove farmers report “usually” or always having access to sufficient food.

Food security, as presented in Figure 21, is an important well-being–related issue among some farmers in Indonesia (e.g., Hanie and Tsegai, 2016) and among tobacco farmers in many parts of the world (Eriksen et al., 2015). Approximately 12 percent of individuals from clove-farming households reported serious food insecurity, which was comparable to what we found in the companion survey in several tobacco-growing regions though considerably less than in Lombok where food security was a serious challenge for many tobacco farmers.

Less than one-third of clove-farming households grew their own food. Among the survey respondents, 32 percent reported producing their own food. The survey asked households for how many months the cultivated food fed the household (see Table 17). Thirty percent reported that they grew enough for the entire year. Importantly, this does not necessarily equate to a lack of food security. In many cases in the FGDs, farmers reported growing other cash crops and using the monetary proceeds of the cultivation to buy food in the marketplace. This dynamic was similar to what others found in recent surveys of tobacco farmers (e.g., Chavez et al., 2016; Goma et al., 2015; Magati et al., 2016; Makoka et al., 2016).

Table 17: Staple Food by Number of Months Produced

LONGETIVITY OF FOOD SUPPLY	OBSERVATION 190	MEAN 6.64	MINIMUM 0.33
Months that staple food production lasts for household	Month	Freq.	Percent
	<1 months	8	1.58
	2 Months	3	17.37
	3 Months	33	21.05
	4 Months	40	9.47
	5 Months	18	10.53
	6 Months	20	1.05
	7 Months	2	2.11
	8 Months	4	0.53
	9 Months	1	1.58
	10 Months	3	0.53
	11 Months	1	30
	12 Months	57	29.69
	Total	190	100

Clove farmers who cultivated more cloves were more likely to be food secure.

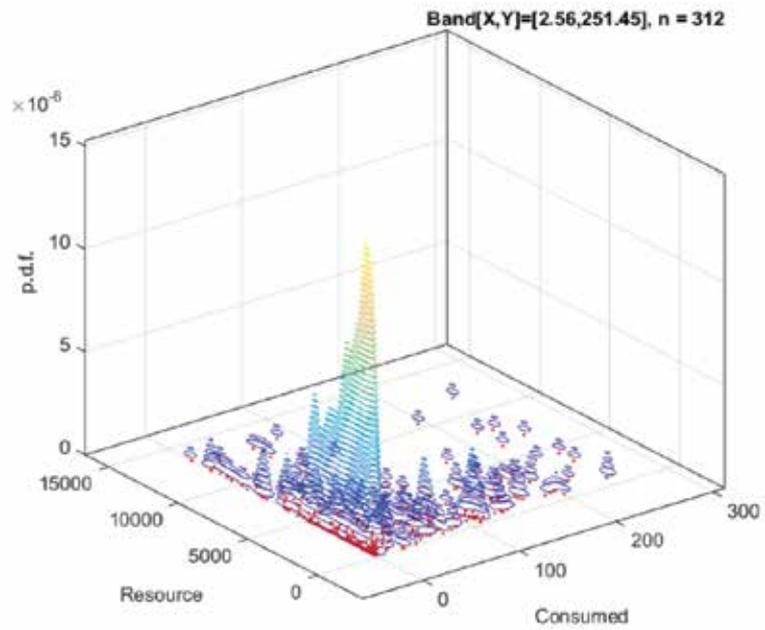
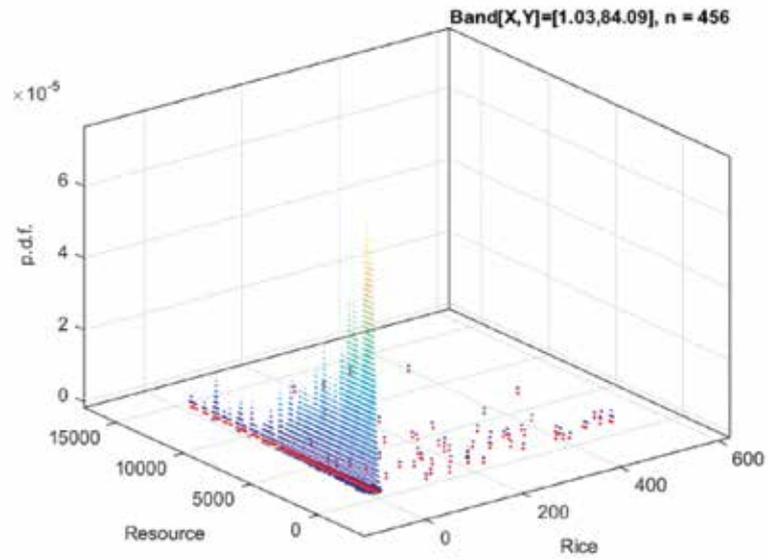
We also examined food security through multivariate analysis. As a dependent variable we used a dichotomous measure of whether a household always had enough to eat (a “1” value). We used the previous literature on food security (Eriksen et al., 2015; Khisa, 2011), machine-learning methods and stepwise regression to identify the relevant independent variables from the survey results. In Table 18, we report only the statistically significant coefficients, though the foundational analyses are available in our online appendices. We find that clove farmers who use more land to farm cloves are more likely to be food secure, though we find that the coefficient for the overall hectareage cultivated (for all crops) is negative and statistically significant. Household size is positively and significantly related to food security suggesting that larger households are more likely to be secure.

Table 18: Logistic Regression of Determinants of Food Security

VARIABLES	COMPLETE CASE	IMPUTED MISSING
Hectares of land for clove farming	10.76*** (4.061)	2.703 (1.942)
Hectares of land cultivated	-3.300*** (1.084)	0.381 (0.823)
Income from other crops	-0.000947** (0.000439)	-0.000236 (0.000215)
Total income (\$100)	0.000386 (0.000304)	0.000327** (0.000141)
Growing Sikotok cloves (vs. white cloves)	-1.755 (1.515)	-3.097*** (0.773)
Unclear about input costs	-1.941*** (0.605)	-1.154*** (0.376)
Household size	1.705*** (0.450)	0.537** (0.213)
Observations	250	600
Standard errors in parentheses *** p < 0.01, ** p < 0.05, * p < 0.1		

There was limited variation in the amount of staple rice crops grown by clove farmers. We examined the decision to grow the staple crop, typically rice. First, only 170 households grew rice out of the 597 households that reported rice as their staple food, suggesting that the majority of households buy their rice and grow other crops on their land. In Figure 22, we observe that most households regardless of their overall resources grow about the same amount of rice, and typically not a sufficient amount to feed the household. Recent reports suggest that the average individual in Indonesia eats between 114 kg (Wall Street Journal, 2015) and 163 kg (OECD-FAO 2015) of rice. We also examined broader decisions to grow all food crops. Accordingly, in Figure 22, we plot the number of households by their total resources and all of the food crops that they grow. We find a slightly different finding here wherein lower resource households are much likelier to grow other food crops to feed their families. In brief, the results suggest that the relationships between cropping decisions and food security are complex.

Figure 22: Total Household Income against Actual Rice Grown (bivariate probability density function, p.d.f.)



5 / CHILD LABOUR

Child labour in clove farming occurred in only a small proportion of surveyed households. The International Labour Organization estimates that up to 1.5 million Indonesian children, aged 10-17, work on farms (ILO, 2015). A recent Human Rights Watch report examined this dynamic on tobacco farms specifically (see HRW, 2016). Accordingly, we asked respondents about each household member’s contribution to farming cloves, including children. Recognizing that child labour is prone to underreporting because of possible social stigma and children contribute to the work on farms to a certain extent in most countries in the world, we particularly sought to determine if children were working consistently during school hours. In Table 18, in the columns under “# of Cases Worked,” we report any time a respondent indicated that a child (both under 18, and under 15, which is the more common age of adulthood in Indonesia) had worked at the specific agricultural activity pertinent to clove farming. In the second set of columns, we report the number of times that a child was reported working more than nine times in a month during official school hours at each activity. We were able to cross-reference working and school attendance because the survey asked whether the child went to school in the morning or afternoon, and then asked when each individual was working at clove farming at specific times. We found that a child working occurred in less than 10 percent of cases for harvest and postharvest activities. For children working consistently during school hours, the proportion dropped to 0.2% for harvest and postharvest activities. It is important to reinforce that this was not a focus of the survey, and child labour is a very difficult phenomenon to measure in a survey (for example, the HRW (2016) report was observational of a random selection of tobacco farms).

Table 19: Child Labour

	# OF CASES WORKED		# WORKED DURING SCHOOL HOURS	
	<18 years old	≤15 years old	<18 years old	≤15 years old
Nursery	19	9	5	5
Land preparation & transplant	18	7	4	4
Field tending	26	10	5	5
Harvest	64	34	14	14
Postharvest (incl. curing)	70	34	11	11
Selling & marketing	15	7	1	1
Clove farming	98	56	20	20

6 / LIMITATIONS

The findings from this report provides a comprehensive picture of the farmers' economic livelihoods in Indonesia, when considering these findings a few considerations are necessary. First, the survey coverage included Central Java and the two largest-producing areas of Sulawesi, which is about 70% of national production. Production is widely dispersed otherwise and it was too costly to include other areas. However, we do not have any a priori reasons to believe that clove farmers in other parts of the country are different than those in this survey.

Many clove farmers were older than the average Indonesian so calculation of their replacement wage may be affected. The oldest household members—especially those over 60 years—would be most likely to replace clove farming with either other agricultural endeavors or household-based microenterprises and not wage-based employment. More research into the age dynamic of clove farming is necessary.

Similarly, the survey generally did not deeply examine the specific alternatives that clove farmers might undertake if they stopped clove farming. It would be useful in future research to explore what options farmers perceive and place them into other research or economic opportunities by region.

7 / CONCLUSION

Clove production is a widespread agricultural activity in Indonesia, particularly in Central Java and Sulawesi. Accordingly, policy makers are concerned that changes in the tobacco product tax structure, including the minimization of tiers and the increase of excise tax rates on kreteks, will negatively affect consumption and therefore the livelihoods of clove farmers. The research undergirding this report finds several crucial features of clove farming that should help policy makers to better evaluate any potential disruptions to the clove supply and value chains that might affect these farmers.

First, for most clove-farming households, clove farming is a small fraction of the household's broader economic activity. Thus, a decrease in demand for kreteks that might lead to a decrease in demand for cloves is only going to affect most clove-farming households to a small extent economically. This effect could also be mitigated or eliminated if farmers re-allocated their resources to other economically fruitful pursuits and/or if the government helped these farmers to shift to other activities. A "loss" should not be presumed, particularly considering that the evidence here suggests that most of these households have varied economic activities to which they could reallocate capital, land and/or labour.

Second, clove farming does not appear to be highly lucrative for many of these farmers, particularly in certain regions (e.g., Minahasa). Even the gross margins reported by most households suggest that clove farming is, at best, a small side business for the vast preponderance of these households. Even in the unlikely scenario that farmers were not able to grow something else on their land and/or use the time previously allocated to clove farming for new economically productive activities, the loss to the vast majority of these households would be small because the contribution in real terms was typically small. In fact, it is quite possible that clove farmers could easily use their land just as or more productively growing other crops, and/or use their time more productively either economically or for other enriching purposes such as education, family, or recreation.

Third, individuals in clove farming households, on average, are poorer than the average Indonesian household, which reinforces the idea that land and/or time might be better allocated to more economically lucrative pursuits, particularly in places where there are more viable options.

RECOMMENDATIONS

In terms of considering what might happen if there were a change in tax policy that affected demand for Indonesian cloves, it is important to reiterate that clove farming is not particularly profitable for most clove-producing households in at least a couple of major clove-producing districts. The government needs to research which alternatives could be viable and target these least-profitable areas for switching and help these farmers make successful transitions to growing other crops and/or economic activities.

- In case of negative effects from higher tobacco taxes, the government could help clove farmers to identify other economically fruitful pursuits.
 - Research which alternative locally-grown crops are most viable on former clove-producing land;
 - Enhance supply and value chains for these alternative local crops;
- Support research to identify the areas where clove production is least viable (e.g., Minahasa) and target those areas for alternatives first;
- Improve agricultural extension services for non-clove crops;
- Provide educational grants for improving clove farmers' agricultural management skills;
- Improve access to credit for farmers to grow other crops or pursue other small economic enterprises such as a small shop, fish farming, or a local transportation business.
 - Provide grants or low-interest loans to farmers willing to switch to alternative crops; and
 - Introduce financial programs or economic development programs as forms of transition assistance away from clove cultivation.

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