

THE ECONOMICS OF KRETEK ROLLING IN INDONESIA

Health, Population, and Nutrition
Global Practice



Cover photos (clockwise from left): Box of Asian cigarettes. Photo by zodebala / iStock. Tobacco Crop in Indonesia. Photo by hanafichi / iStock. Portrait of man and rooster, Indonesia. Curt Carnemark / World Bank. Indonesia Java Malang, factory for clove cigarettes Kretek, women roll tobacco and clove dust in cigarettes manually. Photo by Joerg Boethling / Alamy Stock Photo.

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LIST OF ACRONYMS

BPJS	Badan Penyelenggara Jaminan Sosial
FGD	Focus Group Discussion
FT	Full-time
FTE	Full-time Equivalent
GDP	Gross Domestic Product
KIS	Kartu Indonesia Sehat
KKS	Kartu Keluarga Sejahtera
KPS	Kartu Perlindungan Sosial
NCD	Noncommunicable Diseases
PBI	Penerima Bantuan Iuran
PPP	Purchasing Power Parity
Rp	Indonesian Rupiah
SKM	Machine-made kretek
SKT	Hand-made kretek
SPM	White cigarettes

EXECUTIVE SUMMARY

Indonesia, home to 73.6 million smokers estimated as of 2015, has one of the highest rates of cigarette consumption in the world. Smoking prevalence among working-age individuals has exceeded 30 percent since 2001. In 2013, smoking prevalence among males was 66%, while smoking prevalence among females was 6.7%. If the current trend of smoking rate remains unabated, the smoking population will grow to 95 million by 2025. The share of the smoking population could be reduced from 35.7% in 2010 to 25% in 2025, if Indonesia adopts the global target endorsed by the United Nations General Assembly in 2011 (30% relative reduction in smoking prevalence) for prevention of premature deaths from four major noncommunicable diseases (NCDs), such as, cancer, diabetes, lung disease and cardiovascular disease.

Indonesia has one of the most complex cigarette excise tax systems in the world.

The current cigarette excise tax has 12 tiers, which are based on the type of cigarettes, the number of cigarettes produced, and per-unit retail price. Such a system favors downward substitution to lower priced products and has limited impact on smoking reduction. The tiers in the cigarette excise tax structure aim to accommodate small-scale cigarette firms, especially SKT firms. The rationale for such a structure is that smaller SKT firms account for more than half of total factories in the tobacco industry. Moreover, these firms are responsible for employing a significant share of the workers in tobacco manufacturing.

This report aims to contribute to the policy debate over the tobacco excise tax reform and employment in Indonesia by identifying the socioeconomic and labor market characteristics of kretek workers and their households from two large kretek producing districts.

The analysis in this report is based on data collected from a sample survey of 720 kretek workers' households from two large kretek producing districts, Kudus and Malang. The rationale for undertaking a special survey of hand-rolled kretek workers' households is twofold. First, kretek making is much more labor intensive in hand-rolled kretek firms than in machine-made kretek firms. It is estimated that 93% of kretek workers are employed in hand-rolled kretek factories (World Bank, 2017a). However, the existing national-level surveys do not distinguish between kretek workers in machine-made and hand-rolled kretek firms. Second, the insight into the qualitative dimensions of choice of livelihood, particularly the work-life preference pattern of predominantly female hand-rolled kretek workers, is critical in identifying the alternative livelihood options for displaced kretek workers. This dimension was captured in both the focus group discussions (FGDs) and a specific module on kretek workers' livelihood options in the kretek roller household survey.

We found that Kretek workers are typically female, older adults with a low level of education. The average age of the kretek worker is 40 years, and about 94% of the kretek workers are female. More than half of the kretek workers obtained an elementary educa-

tion. About 27% of the kretek workers obtained a junior high school education, while only 15% of them obtained a senior high school education.

The kretek rollers in the sample work mostly in large firms, and the clear majority are production line workers. Large firms employ 72.6% of the workers, followed by 20.2% in medium firms and only 4.9% and 2.3% in small firms and micro firms, respectively. Kretek workers are involved in different stages of kretek production. About 38% are involved in rolling paper, 33% in filling tobacco dust, 38% in cutting, 31% in packaging, and 13% in ticketing. About 46% of these workers are engaged in more than one task.

The majority (65%) of the kretek workers reported having an unwritten contract with their firms. While there is no significant difference between wages of contract and casual workers, a significantly larger fraction of contract workers reported receiving non-wage benefits from their employers, such as, paid sick leave, paid holiday/vacation, and paid maternity leave.

An average kretek worker has been working in her firm for 214 months or close to 18 years and only a third were working full-time in the kretek industry.

The observed long-term employment opportunity of kretek workers suggests that the kretek industry offers a sense of job security that they may not get in other occupations. The full-time workers worked on average 2,568 hours annually, while kretek workers who worked less than full-time worked on average 1,426 hours annually. The full-time employment among kretek workers is 80.4% (639 FTE workers out of 795), which means that the 307,793 workers employed in the kretek industry as of 2014 are equivalent to 247,394 full-time workers. Given that kretek workers are predominantly female who are less likely to be household heads and more likely to have nonmarket responsibilities (e.g., child care, household chores), it is typically the motivation to provide supplementary income for the family that drives the less than full employment nature of kretek rolling.

About two-thirds of the kretek households (60.84% of the sample) reported receiving at least one form of social benefits in the past year provided by the government of Indonesia. These are social safety nets for the poor and near-poor population documented in the ownership of a Social Protection Card (*Kartu Perlindungan Sosial, KPS* and *Kartu Keluarga Sejahtera, KKS*) and Health Insurance Card (*Kartu Indonesia Sehat, KIS* and *BPJS Penerima Bantuan Iuran, PBI*). These benefits include cash assistance or transfer, rice for the poor (*raskin*), assistance for health payment, assistance for poor students, and assistance from the social protection programs of KPS or KKS. About 11.9% of kretek households own KPS or KKS cards. They are entitled to a monthly cash assistance of Rp 200,000 (US\$15). We find that enrollment in the rice for the poor program is positively and significantly correlated with female-headed households.

We estimate that the desired tax increase will reduce employment in the handmade kretek industry by about 0.22% which is equivalent to loss of jobs of 2,245 workers.

On average, kretek workers' households whose member is laid off from the kretek industry

would experience a decrease in the household wage income by about 50%, in household resource by about 39%, and in household income by about 42%. The decrease in wage income is estimated to be higher at 50%. However, households have other income sources such as farm and nonfarm resources. Thus, the estimated drops in household resource and income are still lower than the estimated drop in wage income. Nevertheless, some households would lose as much as 31–47% of total household resources or 27–52% of household total income. These are quite significant as affected households would lose, on average, more than one-third of their total resource and income.

The total income loss from the reduction in employment in the handmade kretek industry amounts to 0.1% of the revenue gain from increasing cigarette taxes. The World Bank and American Cancer Society (ACS) estimate that the annual revenue gain would be Rp 10,915 billion. Given the mean annualized kretek income at Rp 15,500,000 and the projected decrease in wage income by 41%, the loss of 2,245 jobs in the kretek industry would imply total income loss amounting to Rp 14.3 billion, which is about 0.1% of the revenue gain. This is a win-win policy change because the tax and price increase will not only reduce tobacco use and related health costs, it will generate additional revenue which can more than compensate for the income loss due to a reduction in production and employment in the kretek industry.

Based on the findings of this report, we can draw two major policy recommendations:

- » First, the groups affected by the reform who would need income or other transitional support in the event of job loss include the workers who are less educated, older, heads of their households, and who contribute a significant proportion of total household income from kretek rolling. Any losses in jobs or incomes will be quite gradual, though. The government could provide income support to these workers with less than 2 percent of the revenue gained from a tax increase.
- » The government (Ministry of Finance and Ministry of Social Affairs) should provide temporary income support using the existing Social Assistance programs (such as the unconditional cash transfer program, Bantuan Langsung Sementara Masyarakat - BLSM) and identify alternative employment or income-generating opportunities in the affected regions. The re-training of laid-off kretek workers should be designed to accommodate transitions into these alternative employment opportunities.

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), clove farmers (World Bank, 2017c), and tobacco manufacturing more broadly (World Bank, 2017a).

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1

INTRODUCTION

Kretek or clove cigarette is a major form of combustible tobacco product in Indonesia, home to 73.6 million smokers estimated as of 2015 (around 40% of the adult population). If the current trend of smoking rate remains unabated, the smoking population will grow to 95 million by 2025. The share of the smoking population could be reduced from 35.7% in 2010 to 25% in 2025, if Indonesia adopts the global target endorsed by the United Nations General Assembly in 2011 (30% relative reduction in smoking prevalence) for prevention of premature deaths from four major noncommunicable diseases (NCDs), such as, cancer, diabetes, lung disease and cardiovascular disease.

Indonesia is poised to fight the NCD epidemic by reducing tobacco use through aggressive tobacco control measures including significant increases in tobacco taxes. The tobacco industry in Indonesia has been actively defying tax increases based on the argument that the livelihood of workers employed in the tobacco industry depends on the continuing demand for tobacco products, and their economic well-being would be at stake if they lose jobs due to a fall in production in the wake of falling demand in this sector. The employment consideration in tobacco manufacturing has also been reflected historically in the preferential treatment of the hand-rolled kretek industry in cigarette excise tax policy (see Box 1).

The costs of employment and income loss are, however, expected to be minimal when compared to the social and fiscal gains attainable from tax increases. The additional revenue generated from tax increases can be channeled to provide income support to displaced tobacco workers and help them find alternative sources of employment. By examining the socioeconomic status and alternative livelihood options of kretek workers, we provide an estimate of the income loss that kretek rollers can incur vis-à-vis the revenue gain from a desired tax increase. We argue that the additional revenue can be made available to provide government support required to compensate the affected households for surviving the income shock and re-skill the kretek workers to make transitions to alternative jobs.

Using data from the Indonesian Central Bureau of Statistics, the World Bank estimates 307,793 kretek workers in Indonesia in 2014 (World Bank, 2017a). With an average household size of four, this employment size implies that approximately 1.2 million people are dependent on kretek rolling for their livelihood in Indonesia. The report shows that tobacco manufacturing represents only a small share of the economy wide employment (0.60%). Additionally, the contribution of the tobacco manufacturing to employment in the manufacturing sector is quite small (5.3%) in comparison to the

contribution of the food (27.43%), garment (11.43%), and textile (7.90%) sectors. Although small, tobacco manufacturing jobs are heavily concentrated with about 94% of tobacco manufacturing workers in Central Java, East Java, and West Nusa Tenggara. In these provinces, several districts are quite dependent on tobacco sector employment, as for example Kudus (30%), Temanggung (27.6%), and Kediri (26%).

This report identifies the socioeconomic and labor market characteristics of kretek workers and their households from two large kretek producing districts. The analysis in this report is based on data collected from a sample survey of 720 kretek workers' households from two large kretek producing districts, Kudus and Malang. The details of the survey methodology are provided in Appendix A. The purposive selection of sample districts is driven by a high degree of regional concentration of kretek factories. Based on the annual Survey of Industry (SI), 40% of Indonesian kretek workers are in three districts only—Kudus (21.4%), Kediri (10.2%), and Malang (8.6%) (World Bank, 2017a).

The rationale for undertaking a special survey of hand-rolled kretek workers' households is twofold. First, kretek making is much more labor intensive in hand-rolled kretek firms than in machine-made kretek firms. It is estimated that 93% of kretek workers are employed in hand-rolled kretek factories (World Bank, 2017a). It is expected that the brunt of the employment impact of tax policy change would be felt by those currently employed in hand-rolled kretek factories, and they would need targeted intervention for income support and redeployment programs. However, the existing national level surveys do not distinguish between kretek workers in machine-made and hand-rolled kretek firms. Due to this limitation, we were unable to investigate the socio-economic and livelihood conditions of hand-rolled kretek workers in isolation from the machine-made kretek workers. The hand-rolled kretek roller survey thus complements the existing national level surveys. Second, the insight into the qualitative dimensions of choice of livelihood, particularly the work-life preference pattern of predominantly female hand-rolled kretek workers, is critical in identifying the alternative livelihood options for displaced kretek workers. This dimension was captured in both the focus group discussions (FGDs) and a specific module on kretek workers' livelihood options in the kretek roller household survey.

This report consists of six sections, including this introduction. The next section, Section 2, describes the socioeconomic profile of kretek workers and their households. In Section 3, the labor market characteristics of kretek workers are discussed. The livelihood status of kretek workers are covered in Section 4. Section 5 presents the simulated results of the impacts of cigarette excise tax policy reform on the livelihood of kretek workers. Finally, Section 6 concludes with the summary of findings and policy recommendations.

Box 1: Kretek Industry in Indonesia

The history of mixing cloves with tobacco to make kreteks in Indonesia dates back to the seventeenth century, although the commercialization of clove cigarettes on a successful scale did not take place until the twentieth century.

Initially, kreteks were rolled by hand in a cottage environment and the industry was dominated by the Javanese Indonesians. The ownership of kretek industries gradually went to the hands of Chinese entrepreneurs, who played a key role in large-scale production of kreteks and the emergence of the largest kretek companies such as Djarum, Bentoel, Gudang Garam and Sampoerna. Hand-rolled kreteks occupied the kretek market exclusively until 1968 when mechanization began in this industry.

Mechanization in the kretek industry was a natural response of the kretek companies to growing demand for kreteks that necessitated a rapid increase in production and led to a shortage of labor in the 1970s to 1980s. Between 1970 and 1990, annual cigarette consumption in Indonesia more than quadrupled from 33 to 141 billion sticks. Mechanization was, however, a privilege of only the large companies until the early 1980s. The regulation of the Directorate General of Customs and Excise in 1979 limited the production of machine-made kreteks in small- and medium-scale enterprises to a proportion of 1:2 of machine vs. hand-rolled kreteks. Large-scale enterprises were exempted from this regulation. This regulation was targeted to secure employment in small- and medium-scale factories by limiting machine production of kreteks. It, however, offered a competitive advantage to large-scale firms in gaining control of the market through product innovation such as production of filter kreteks by machines.

In 1987, the government introduced a tax regulation offering a preferential tax structure in favor of hand-rolled kretek factories—5–7 percent of retail price for hand-rolled kreteks and 35–37 percent for machine-made kreteks. Although the tax rates have been raised over the years, the differential tax regime offering advantages to hand-rolled kreteks over machine-made kreteks have continued until the present days.

As of 2017, the excise tax on hand-rolled kreteks is 20–33 percent of minimum retail price, while the excise tax share is 45–51 percent for machine-made kreteks, the range depending on the production volume of factories and range of retail price. Securing employment in hand-rolled kretek factories has been the driving force behind this lopsided cigarette excise tax structure in Indonesia.

Source: Arnez, M. Tobacco and Kretek: Indonesian Drugs in Historical Change. *Austrian Journal of South-East Asian Studies* 2009: 2(1).

2

SOCIOECONOMIC PROFILE OF KRETEK WORKERS

Kretek workers are typically female, older adults with low levels of education. Table A2 in Appendix A (*Sampling and Survey Methods*) summarizes the socioeconomic characteristics of the kretek workers and their household members in the sample. The average age of the kretek worker is 40 years, and about 94% of the kretek workers are female. More than half of the kretek workers obtained elementary education. About 27% of the kretek workers obtained a junior high school education, while only 15% of them obtained a senior high school education.

Kretek rollers' households rely on diverse sources for wage income. About half of wage workers in the kretek-rollers' households work in kretek firms as their primary occupation (Table 1). The second largest proportion of household members (17.5%) work in the construction sector. Almost all kretek rollers (98.6%) reported that they have other household members who work in different sectors other than kretek rolling, such as farming, nonfarm agricultural activities, utilities, mining and quarrying, construction, transport, food processing and sales, textile industry, trading, and different services. Thus, less than 2% of kretek rollers' households depend solely on kretek rolling as their main occupation and are likely the most vulnerable segment of the population dependent on the kretek industry.

While lack of skill generally limits market opportunities to be employed, there is no specific skill requirement to work in a kretek factory, as revealed by several FGD participants. Other reasons for working in a kretek factory are the proximity to home, favorable working hours, and avoidance of boredom. One participant mentioned that she works shorter hours in a kretek factory (6 A.M. - 12 noon) than in other sectors (7 A.M. - 5 P.M.). The participants also mentioned that a typical wage laborer or salaried employee receives wages or salaries on a weekly or monthly basis, while kretek workers receive daily wages which offer them greater liquidity of money. Furthermore, some participants mentioned that they did not formally apply to work in kretek factories. They were brought in by their friends or relatives and became apprentices in the factories.

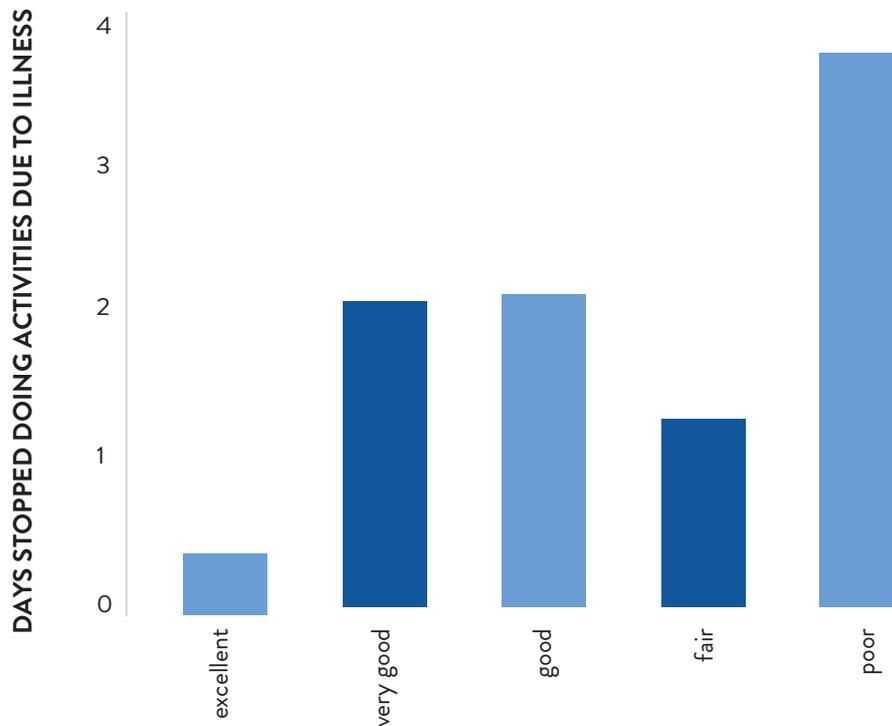
About 70% of kretek workers reported that they are either in good, very good, or excellent health condition. Only 3.2% of workers reported poor health status. About 35% of workers reported to have suffered from any illness or injury in the past 30 days. The median number of days these workers suffered from illness or injury is three. The median number of workdays lost due to illness or injury is one. In Figure 1, we show the average

Table 1: Primary and secondary occupations of the members of kretek rollers' households

SECTORS	PRIMARY OCCUPATION		SECONDARY OCCUPATION	
	Frequency	Percent	Frequency	Percent
Agriculture—nontobacco	66	4.09	21	27.27
Forestry, animal husbandry, fishing	14	0.87		
Electricity, gas, water	2	0.12	1	1.30
Mining and quarrying	7	0.43	2	2.60
Construction/building	282	17.49	6	7.79
Transport, storage, communication	17	1.05	1	1.30
Financial services, real estate, lease	14	0.87	1	1.30
Restaurant, food sale	26	1.61	4	5.19
Industry: food processing/production	39	2.42	5	6.49
Industry: clothing	15	0.93	2	2.60
Industry: other	159	9.86	11	14.29
Industry: cigarette and cigar	794	49.26	2	2.60
Sale: nonfood	63	3.91	2	2.60
Service: government	9	0.56	3	3.90
Service: teacher	13	0.81	4	5.19
Service: professional	23	1.43	1	1.30
Service: transportation	10	0.62	1	1.30
Service: other (tailor, beauty salon)	54	3.35	10	12.99
Other	5	0.31		
Total	1,612	100.00	77	100.00

Source: Authors' calculations from kretek roller survey.

Figure 1: Number of days stopped working by self-reported health status of kretek workers



Source: Authors' calculations from kretek roller survey.

number of days kretek workers stopped working by their health status. It appears that kretek workers who reported poor health conditions stopped working for about four days, while those who did not report poor health stopped working for about two days. We find no correlation between the number of days stopped working and age.

The employment in kretek factories is mostly localized. Most kretek workers (56%) were born in the same place where they were working and residing. Others migrated from their place of birth to the current place of residence primarily due to marriage (51.6%), work (33.1%) and transfer of residence of family (9.5%). Thus, only 14.8% of all the kretek workers migrated to work in the kretek industry.

There seems to exist relative ease of substitution of labor across industries.

We observe that about 40% of the kretek workers were employed in a different sector, such as textile, food production and processing, farming, retail sales, restaurant, tailoring, beauty salon, and service industries, prior to working in the kretek industry. The fact that nearly half of the kretek workers have prior market skills other than kretek rolling is evidence of resilience to make a transition to a different sector in the event of job loss in the kretek industry.

A quarter of the kretek workers indicated that they switched to the kretek industry because it pays better. It is estimated that workers in tobacco manufacturing draw 14–16% higher wages than comparable workers in other manufacturing sectors (see Table 7 in World Bank 2017a). In addition, 16% of kretek workers reported a better offer of benefits and 17% reported proximity of the kretek factory to residence as the major incentives for switching to the kretek industry. In the FGD, kretek workers mentioned that the benefits of working in a large kretek firm include religious holiday allowance (*tunjangan hari raya*), bonus for national holidays, paid maternal leave, health insurance, and severance pay. One FGD participant mentioned that the pay for maternal leave is equivalent to the salary for 90 days.

More than a fifth of the kretek workers (22.6%) reported that one of their parents or parents-in-law were employed in the kretek industry. Only a small proportion of kretek workers (4.4%) reported that their grandparents were employed in the kretek industry. However, most kretek workers (82%) do not want their children to be employed in the kretek industry because they want to see their children move upward to higher paying jobs.



3

LABOR MARKET OUTCOMES OF KRETEK ROLLERS

The kretek rollers in the sample work mostly in large firms that employ more than 500 workers (72.6%) followed by medium firms with 151–500 workers (20.2%), small firms with 51–150 workers (4.9%) and micro firms with less than 50 workers (2.3%). Based on the unconditional median wage rates (including value of in-kind benefits) reported in Table 2 for daily, weekly, and monthly payments stratified by firm size, we find that larger kretek rolling firms tend to pay higher wages than smaller kretek rolling firms for daily wage laborers. The difference is not systematic for weekly and monthly payments.

Table 2: Median daily, weekly, and monthly wages (Rp) of kretek rollers by firm size

FREQUENCY OF PAYMENT	MICRO FIRM (<=50 WORKERS)	SMALL FIRM (51–150 WORKERS)	MEDIUM FIRM (151–500 WORKERS)	LARGE FIRM (>500 WORKERS)	ALL KRETEK FIRMS
Daily	20,000	20,000	32,900	40,000	40,000
Weekly	350,000	225,000	265,750	407,000	350,000
Monthly	2,200,000	1,400,000	1,639,000	1,670,000	1,670,000
Number of observations	18	39	160	576	793

Most kretek workers (96%) are production line workers. Kretek workers are involved in different stages of kretek production. About 38% are involved in rolling paper, 33% in filling tobacco dust, 38% in cutting, 31% in packaging, and 13% in ticketing. About 46% of these workers are engaged in more than one task. For example, 26.8% of workers are engaged in both rolling paper and filling tobacco dust. There is, however, a clear division of labor on task combinations. Kretek workers engaged in rolling paper are also engaged in filling tobacco dust and cutting. On the other hand, kretek workers engaged in packaging may also be engaged in ticketing, but not in rolling paper, filling tobacco dust, or cutting. Therefore, we classify kretek workers into those who roll, fill tobacco dust, and cut (63%) and those who pack and place tickets (32%). There is generally no difference in specialization in tasks between contract and casual labor, except in filling tobacco dust and packaging where a larger proportion of contract workers are engaged.

In the FGD, participants mentioned that the wage is different across tasks, such as, rolling kretek (*nggiling*), cutting both edges of kreteks (*mbathil*), and packing kreteks (*nyonthong*). For example, a participant who works in a large factory mentioned that they can roll 4,000 kreteks per day and earn Rp 50,000 for rolling (*nggiling*) or Rp 30,000 for cutting the edge of kreteks (*mbathil*). On the other hand, a participant who works in a smaller firm rolls 1,500 to 2,000 kreteks per day and earns Rp 16,000 for rolling or Rp 11,000 for cutting the edge of kreteks.

Most workers (96%) receive annual religious holiday allowances and three-quarters receive health allowance from their employers, suggesting a wide coverage of benefits offered by the kretek industry. Moreover, over two-thirds of workers reported that they receive masks, apparel, and hats as safety equipment in their workplace. In case of illness, 40% of workers receive free medication from factory clinics, 67% of workers are covered by the Indonesian National Health Insurance Badan Penyelenggara Jaminan Sosial (BPJS), and 32% of workers receive reimbursements for medications they purchase individually.

About 15% of kretek workers reported having a written contract, and 65% had unwritten contracts with their firms. While there is no significant difference between wages of contract and casual workers, a significantly larger fraction of contract workers

Table 3: Percentage of contract and casual kretek workers receiving employer provided benefits

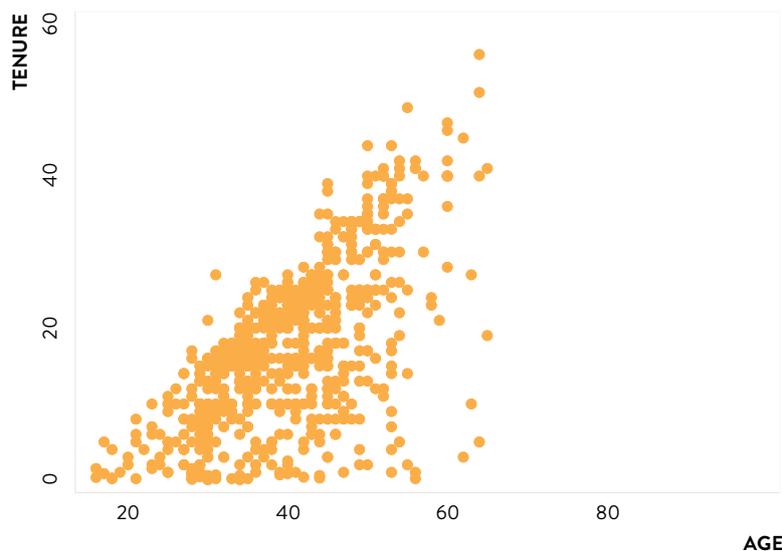
BENEFITS	% OF CASUAL KRETEK WORKERS	% OF CONTRACT KRETEK WORKERS	% OF ALL KRETEK WORKERS
Paid sick leave	16.5	64.6	54.7
Paid holiday / vacation	10.4	16.2	15.0
Paid maternity leave	12.2	64.8	53.9
Free/subsidized meals	4.3	3.0	3.3
Free/subsidized lodging	0.0	0.3	0.3
Bonus	51.2	48.6	49.1
Working dress	71.3	78.5	76.8
Contribution to pension fund	9.8	8.7	8.9
Severance pay in case of job termination	70.1	93.0	88.3

Source: Authors' calculations from kretek roller survey.

reported receiving nonwage benefits from their employers, such as, paid sick leave, paid holiday/vacation, paid maternity leave and severance pay (Table 3). Note that while the coverage of severance pay benefit is enormous (93%) for contract workers, the percentage of casual workers receiving this benefit (70%) is not negligible.

Kretek workers enjoy long tenure in the kretek industry. An average kretek worker has been working in her firm for 214 months or close to 18 years. There is a positive and significant correlation between the length of tenure and the age of workers as shown in Figure 2. On average, the tenure of workers aged 15–30 is 7.2 years, aged 30–40 is 15.5 years, aged 40–50 is 21 years, and aged above 50 is 29 years. The observed long-term employment opportunity of kretek workers suggests that the kretek industry offers a sense of job security that they may not get in other occupations.

Figure 2: Correlation between length of tenure and age of kretek workers (in years)



Source: Authors' calculations from kretek roller survey.

Only a third of kretek workers were working full-time in the kretek industry. The full-time workers worked on average 2,568 hours annually, while kretek workers who worked less than full-time worked on average 1,426 hours annually. Since two-thirds of the kretek rollers are less than full-time employed, we estimate full-time equivalent (FTE) employment of the kretek rollers in the sample by assigning weights to each kretek roller based on the number of work hours they reported for the last 12 months. For the full-time employed, the weight is 1. For the less than full-time employed, the weight is given by the ratio of the number of hours they worked in kretek rolling to annual full-time work hours (40 hours per week \times 50 weeks = 2,000 hours assuming leave of 2 weeks). The sum of these weights provides the

FTE number of kretek rollers. The FTE employment is thus 80.4% (639 FTE workers out of 795) of the actual number of individuals employed in kretek rolling. By this measure, the 307,793 workers employed in the kretek industry as of 2014 is equivalent to 247,394 full-time workers.

An FTE ratio of less than one may indicate the presence of underemployment or casual labor, as well as willingness to provide supplementary income for total household earning among kretek workers. Given that kretek workers are predominantly female who are less likely to be household heads and more likely to have non-market responsibilities (e.g., child care, household chores), it is typically the motivation to provide supplementary income for the family that drives the less than full employment nature of kretek rolling.

Labor force participation is somewhat higher among women (80%) than men (74%) among working-age members (15–69 years) in kretek rollers' households. The female labor force participation rate is biased upward given the sample selection criterion of the inclusion of households with at least one kretek roller who is predominantly female. Among the female labor force participants, 85.5% are employed in the kretek industry, indicating the predominance of the kretek industry as a source of employment to the female labor force in the region. The other 14.5% female workers are employed in retail sales, the food processing industry, services such as tailoring and beauty salon, garments industry, teaching and other professional services, farming, restaurants, and other industries.

In what follows, we examine the determinants of labor force participation and work hour decisions in the kretek industry. Since most workers in the kretek industry are women (94%) and female labor supply decisions are characteristically different from male labor supply, we have limited the labor supply analysis below to female kretek rollers only.

The labor supply decisions in kretek industry can be modeled in three stages:

1. Participation in the labor market
2. Choice to work in the kretek industry conditional on participation in the labor market
3. Work intensity or number of hours worked annually conditional on labor market participation and choice to work in the kretek industry

In order to determine the wage elasticity of labor supply of kretek rollers, we have used a predicted wage from an ordinary least squares (OLS) wage regression (Column 1 in Table 4) fitted with the basic socio-demographic characteristics and area of residence of the female working-age (15–69) individuals in the sample. The reported wages for working individuals are replaced with predicted wages in order to address the possible endogeneity of the wage variable in the regression.

Table 4: Results of estimation of female kretek rollers' labor supply function

	1: HOURLY WAGE (OLS)	2: PROBABILITY TO PARTICIPATE IN LABOR MARKET (PROBIT)	3: PROBABILITY TO WORK IN KRETEK INDUSTRY (PROBIT)	4: WORK HOURS IN KRETEK INDUSTRY (OLS)
Predicted hourly wage (thousand Rp)		0.0091 (0.11)	-0.1259 (-1.86)	-9.5887 (-0.75)
Age	-0.0003 (-0.02)	-0.0017 (-1.24)	0.0066*** (4.73)	0.8670 (0.24)
Married	1.993*** (3.41)	0.2611 (1.53)	0.4110** (3.03)	290.6* (2.05)
Divorced/separated/ widowed	1.037 (1.33)	0.1204 (1.23)	0.2013* (2.53)	227.8 (1.42)
Elementary education	1.496** (2.62)	0.1836 (1.36)	0.3170** (2.78)	28.17 (0.23)
Junior high school education level	1.844** (2.91)	0.1607 (0.97)	0.3369* (2.45)	118.2 (0.89)
Senior high school and above education level	3.068*** (4.45)	0.0698 (0.26)	0.3905 (1.80)	-136.6 (-0.87)
Number of children age 5 and below		-0.1153*** (-6.00)	0.0192 (0.97)	-65.26 (-1.38)
Household asset (million Rp)		-0.0038 (-0.48)	-0.0010 (-0.97)	-0.127 (-0.08)
Household nonlabor income (million Rp)		-0.0017 (-1.21)	0.0015 (0.82)	-6.412 (-1.04)
Firm size				105.9* (2.33)
Observations	860	1,080	830	742
Adjusted R ²	0.338			0.303

Source: Authors' calculations from kretek roller survey.

Note: 1. The reference categories include never married and no schooling/kindergarten level education.

2. The coefficients for enumeration areas are suppressed for brevity of presentation. There are 40 enumeration areas in the sample.

3. The estimated coefficients are marginal effects that represent change in the dependent variable from a unit difference in the continuous independent variables or from the reference category for discrete independent variables.

4. *t* statistics are shown in parentheses below the coefficients in Columns (1) and (4). *Z* statistics are shown in parentheses below the coefficients in Columns (2) and (3).

5. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The results of estimation of the above four functions, provided in Table 4, indicate that wage rate is not a significant determinant of women's labor force participation or the decision to work in the kretek industry or number of work hours (Columns 2, 3 and 4). The only significant determinant of labor force participation of women is the presence and number of young children (age 5 and below) in the family. For each additional child, the probability of a woman participating in the labor market goes down by 0.11 (Column 2). However, number of minor children is not a significant factor in the decision to work in the kretek industry. This finding distinguishes kretek rolling as a convenient source of employment for the female labor force, who prefer flexibility of work hours critically needed for household management.

Among the female labor force participants, older, married, divorced/separated/widowed, and workers with elementary or junior high school level educations are more likely to work in the kretek industry than in other sectors (Column 3). The number of annual work hours is significantly higher for married women and for the workers in larger firms (Column 4).

When asked where they would have worked had they not been working in a kretek factory to begin with, about 35% of workers answered that they would have been a housewife. This percentage is somewhat lower (26.8%) among the kretek rollers who are the heads of their households and are presumably heavily dependent on their job in the kretek industry as the principal earner of the family. Kretek workers gave similar responses when they were asked about the type of job they see themselves having if the factory closes.

The likelihood that a kretek roller would have been a housewife is correlated with years of schooling and age. As reported in Column 1 of Table 5, kretek workers with fewer years of schooling are associated with a greater likelihood of being a housewife, as these workers are less likely to possess specific skills that are needed in the labor market. Similarly, older workers expressed greater willingness to turn to be a housewife in the absence of kretek rolling.

The preference of female kretek workers for reverting to the role of a housewife in case of job loss in the kretek industry was also reflected exclusively in the FGDs. The participants revealed that they would not look for any other job. They would rather stay home and take care of children and household chores. Their strong preference for kretek rolling as a job comes from the fact that it offers flexible work hours, and they can enjoy a balance between their responsibilities at work and their households. The flexibility of work hours in kretek factories lends support to the finding in the labor supply function presented in Table 4, that shows the number of minor children in the household is not a significant factor in the decision to participate in kretek rolling.

Table 5: Determinants of reasons to stay or work in the kretek industry

	1: WOULD HAVE BEEN A HOUSEWIFE	2: WOULD HAVE BEEN WORKING IN HOME-BASED ECONOMIC ACTIVITY	3: QUIT WHEN GOVERNMENT HAS REDEPLOYMENT/SOCIAL ASSISTANCE PROGRAM
Years of schooling	-0.013** (0.006)	0.019*** (0.006)	-0.004 (0.007)
Months since first worked	-0.000 (0.000)	0.000 (0.000)	-0.001*** (0.000)
1 if head of households	-0.104 (0.109)	0.030 (0.082)	0.150 (0.094)
Actual age	0.006** (0.003)	-0.004 (0.003)	-0.004 (0.003)
1 if married	0.146 (0.089)	-0.089 (0.069)	-0.013 (0.093)
Number of dependents in the household	0.016 (0.022)	-0.013 (0.022)	-0.007 (0.022)
Both husband and wife work	-0.120 (0.100)	0.113 (0.094)	0.067 (0.093)
Proportion of kretek income in total household income	-0.001 (0.001)	0.001 (0.001)	0.001* (0.001)
1 if have a contract	0.157*** (0.049)	0.006 (0.047)	0.067 (0.047)
Daily payment	-0.237*** (0.042)	0.092** (0.036)	-0.146*** (0.042)
Full-time equivalent	-0.065 (0.085)	-0.056 (0.068)	-0.049 (0.087)
Number of observations	718	718	718

Source: Authors' calculations from kretek roller survey.

Note: * p < 0.10, ** p < 0.05, *** p < 0.01

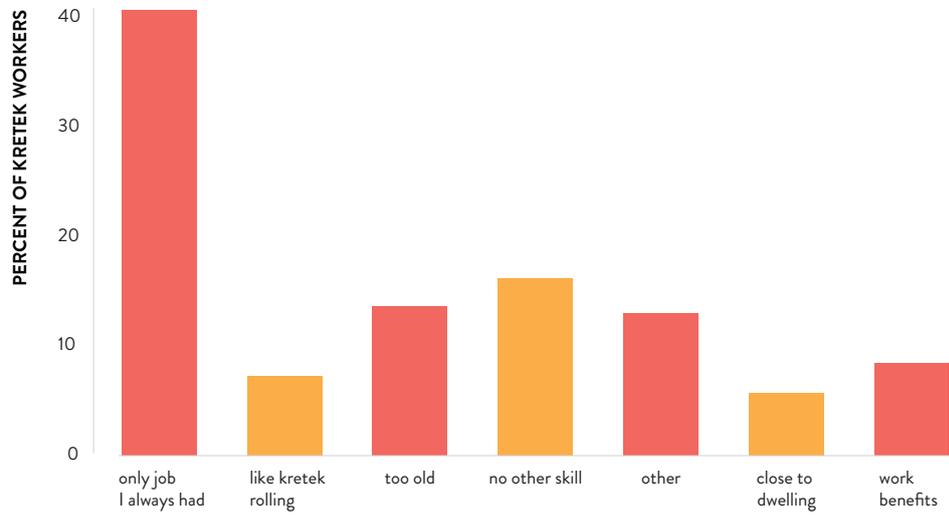
Another 25% of kretek workers reported that they would have been engaged in home-based nonfarm self-employment activities had they not been working in a kretek factory. These activities include, but are not limited to, opening a beauty shop, bamboo wicker business, bird cage business, cake shop, noodle shop, clothes shop, food stall, massage service, meatball shop, phone shop, printing shop, snack/drink stall, doing embroidery, selling fruits, selling cooked snail, or becoming a tailor. As reported in Column 2 of Table 5, kretek workers with longer years of schooling are more likely to choose home-based income generating activities. These workers may have gained specific skills during their schooling years. About 9.4% of kretek workers indicated that they would have been engaged in home-based farming. Thus, in total, about 35% (25% in non-farm and 9.4% in farm activities) of kretek workers indicated that they would have been engaged in micro or home-based enterprises had they not worked in the kretek industry.

Kretek workers were asked if they would quit their job at the kretek industry if the government launches a re-skilling and redeployment program. About 38% of workers are willing to quit their current job, while the majority (62%) are reluctant to quit. As shown in Column 3 of Table 5, kretek workers with longer tenure at the factory are more likely to be reluctant to quit. It is also notable that kretek workers with a higher proportion of kretek income in total household income, who are more dependent on employment in the kretek industry and who are more vulnerable in the event of loss of a job in the kretek industry, are more willing to quit and join a re-skilling and redeployment program.

The critical policy relevant question is whether kretek workers are capable or willing to find employment in alternative occupations. When asked whether they would continue to work in the kretek industry if they have job opportunities offering equal or higher wages than they currently make in the kretek industry, 88% answered in the affirmative. Others indicated that they can be self-employed in household farm and nonfarm activities.

The preference for continuing to work in the kretek industry is strongly correlated with tenure. The largest proportion of workers (40%) reported that the main reason for staying in the kretek industry is that kretek rolling is the only job they ever had (Figure 3). Apparently, these workers are older and have enjoyed longer tenure. Recall that the average length of tenure among kretek workers is 18 years. The long-term nature of employment in the kretek industry suggests that the industry offers a stable and secure job to its workers. Some kretek workers reported that they lack necessary skills for other jobs (15%), are too old to move (13%), and prefer the work benefits (8%)—such as facilities, insurance, and allowance. The minority of kretek workers who preferred to move to another industry argued that working in the kretek industry is harmful to health (24%), they are willing to learn new skills (20%), and they are not earning enough from kretek rolling (7%).

Figure 3: Reasons to continue working in the kretek industry



Source: Authors' calculations from kretek roller survey.

4

THE LIVELIHOODS OF KRETEK ROLLERS

In this section, we investigate kretek workers' livelihoods, including their annual wage income, annual total household income, and total resources, per-capita resource and income, and poverty status.¹ The summary statistics of these characteristics of kretek rollers' households are provided in Table 6. It shows that an average kretek household earned about Rp 32,500,000 (US\$2,437) of total wage income in the past year and about Rp 15,500,000 (US\$1,162) from the kretek industry. So, for the average household in the sample with a kretek worker, income from kretek rolling contributes a bit less than half of the total wage income of the household.

The estimated poverty headcount ratio by the per-capita household resource is 8.8% based on the individual poverty line at US\$1.90 a day at 2011 purchasing power parity (PPP) (Table 6). This figure is quite similar to the national level poverty rate of 8.3% in 2014 (World Bank Poverty and Equity Database). The estimated poverty rate based on the national poverty line of Rp 330,776 per person per month (US\$22.60) is 11.2%, which is identical to Indonesia's statistics estimate of 11.1% in September 2015. So, households with kretek-based income are no more or less likely to be poor than those who do not have any kretek-based income.

The poverty rate increases to 10.7% at US\$1.90 a day at 2011 PPP or 14.3% at the national poverty line when using per-capita household income. The difference in the poverty rates based on the household resource and income measures comes from the difference in accounting for these two measures. Household resource adds up revenue from farm and nonfarm household enterprises with wage and nonlabor income, and household income measure subtracts the costs of farm and nonfarm activities from revenue and adds up the profit (or loss) with wage and non-labor income. While some of the households who incur losses in farm and nonfarm enterprises make up for the loss by cross-subsidizing from wages and nonlabor income, about 2–3% of households fail to do so and are pushed below the poverty line.

¹ We explain in detail the calculation of household income and household resource in Appendix B: Calculation of Total Household Income and Resource.

Table 6: Summary statistics of household income, resources, and poverty status

VARIABLE	MEAN	SD	MIN	MAX
Household size	4.395	1.428	1	11
1 if head of household is female	0.106	0.308	0	1
Annualized wage income (Rp)	32,500,000	19,900,000	1,080,000	138,000,000
Annualized kretek income (Rp)	15,500,000	11,200,000	0	81,600,000
Proportion of wage income from kretek (%)	54.407	29.511	0	100
Nonlabor income (Rp)	1,499,826	6,740,321	0	100,000,000
Farm revenue (Rp)	866,448	3,341,941	0	43,000,000
Nonfarm revenue (Rp)	23,400,000	138,000,000	0	2,400,000,000
Household total resource (Rp)	58,200,000	138,000,000	1,440,000	2,430,000,000
Household total income (Rp)	36,900,000	74,400,000	-1,390,000,000	414,000,000
Per-capita resource (Rp)	14,000,000	34,900,000	585,000	608,000,000
Per-capita income (Rp)	9,152,523	14,400,000	-232,000,000	140,000,000
Poverty by per-capita resource, \$1.90 PPP	0.088	0.283	0	1
Poverty by per-capita income, \$1.90 PPP	0.107	0.310	0	1
Poverty by per-capita resource, Rp 330,776	0.111	0.314	0	1
Poverty by per-capita income, Rp 330,776	0.143	0.350	0	1
Household asset (Rp)	10,600,000	14,200,000	0	252,000,000

Source: Authors' calculations from kretek roller survey.

Note:

1. Statistics are weighted by the size of each household.
2. Household total resource is the sum of wage income, revenue from farm activities, revenue from nonfarm activities, and nonlabor income.
3. Household total income is the sum of wage income, gross margin from farm activities, gross margin from nonfarm activities, and nonlabor income.
4. Gross margin is defined as the difference between revenue and costs, whereas costs is the sum of production costs for hired labor, raw materials, and other operating costs.
5. Household nonfarm revenue is generated from enterprises, such as artisan, metalworking, tailoring, repair work, processing and selling of crops, etc.
6. Household assets are defined as the sum of current values of household durable goods (e.g., television, refrigerator, electronic goods, household appliances, vehicles, etc.).

Table 7: Determinants of poverty status among kretek households

DEPENDENT VARIABLE:	1: POVERTY (US\$1.90 PPP), RESOURCE	2: POVERTY (US\$1.90 PPP), INCOME	3: POVERTY (RP 330,776), RESOURCE	4: POVERTY (RP 330,776), INCOME
Years of schooling of head	-0.013*** (0.003)	-0.013*** (0.004)	-0.014*** (0.004)	-0.016*** (0.004)
Household size	0.004 (0.010)	0.009 (0.011)	-0.002 (0.011)	0.019 (0.015)
Number of dependents <15	0.040** (0.016)	0.043** (0.017)	0.061*** (0.017)	0.047** (0.021)
1 if head of household is female	0.054* (0.030)	0.067** (0.032)	0.065** (0.032)	0.070* (0.036)
Proportion of wage income from kretek	0.001* (0.000)	0.001** (0.000)	0.001** (0.000)	0.002*** (0.001)
Number of individuals	2,838	2,838	2,838	2,838
Number of households	720	720	720	720

Source: Authors' calculations from kretek roller survey.

Notes:

Standard errors are clustered at the household level. * p < 0.10, ** p < 0.05, *** p < 0.01. The coefficients in the table indicate average marginal effects.

The poverty status of households is significantly correlated with a lower level of education of household heads, larger number of dependents below age 15, female head, and higher proportion of kretek income in household total wage income (Table 7). These characteristics can help identify the vulnerable group of households who need immediate support or a social safety net to prevent increased impoverishment from job loss of kretek workers.

About two-thirds of the kretek households (60.84% in the sample) reported receiving at least one form of social benefit in the past year provided by the government of Indonesia. These are social safety nets for poor and near poor populations documented in the ownership of a Social Protection Card (*Kartu Perlindungan Sosial, KPS* and *Kartu Keluarga Sejahtera, KKS*) and Health Insurance Card (*Kartu Indonesia Sehat, KIS* and *BPJS Penerima Bantuan Iuran, PBI*). Table 8 summarizes the enrollment of households into these programs. These benefits include cash assistance or transfer, rice for the poor (*raskin*), assistance for health payment, assistance for poor students, and from the social protection programs of KPS or KKS. About 11.9% of kretek households own a KPS or KKS card. They are entitled to a monthly cash assistance of Rp 200,000 (US\$15). We find that enrollment in the rice for the poor program is positively and significantly correlated with female-headed households.

Table 8: Availability of social safety nets to kretek households

VARIABLE	MEAN	SD	MIN	MAX	N
1 has a social protection card (KPS or KKS)	0.12	0.32	0	1	720
1 has a health insurance (BPJS BPI or KIS)	0.31	0.46	0	1	720
Share of household member with health insurance	0.26	0.44	0	2.5	720
1 if received cash transfer, past year	0.04	0.19	0	1	720
1 if received subsidized rice (<i>raskin</i>), past year	0.57	0.50	0	1	720
1 if received assistance for health payment, past year	0.05	0.22	0	1	720
1 if received assistance for poor student, past year	0.08	0.27	0	1	720

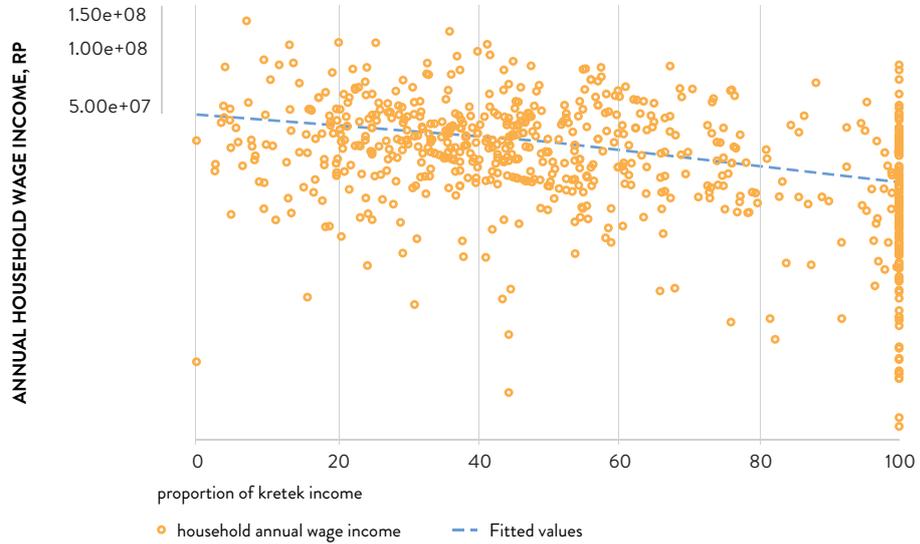
Source: Authors' calculations from kretek roller survey.

More than 95% of kretek households reported having sufficient food in the past year. Only 4.4% of households reported that they did not have enough food for their household. About 70% of kretek households who did not have enough food received rice from the rice for the poor program. When asked about reasons for experiencing food insecurity, many kretek households reported job loss or inadequate income as the main reasons. Note that 98% of kretek households purchase their staple foods, mainly rice, from the market. Dependence on the market to obtain staple foods can make kretek households susceptible to food insecurity in a volatile job market or income uncertainties

In about a quarter of kretek households with an estimated 292,491 household members, the share of kretek income to household wage income is 92% or higher.

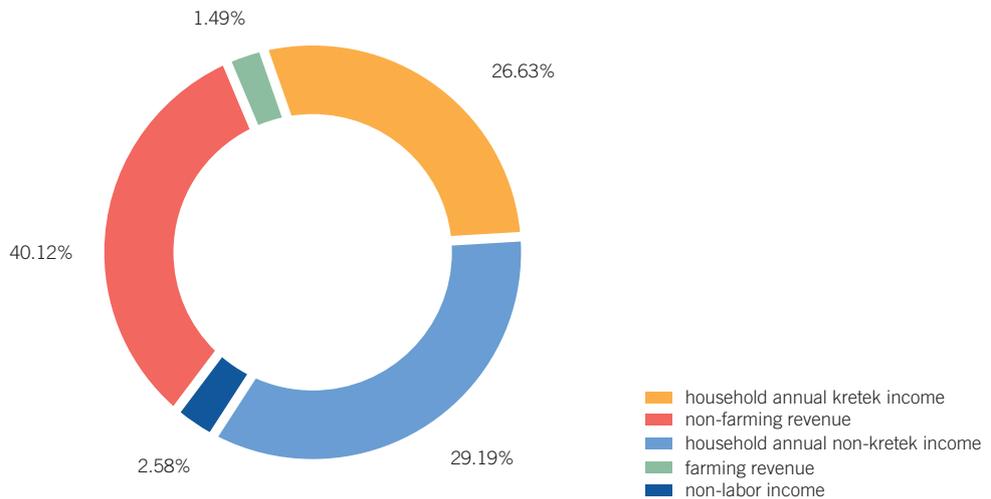
About 22% of kretek households rely solely on kretek rolling for wage income. This percentage is much larger (40%) among female-headed kretek households. We observe that there is a significant and negative correlation between annual household wage income and proportion of kretek income. As shown in Figure 4, households that rely solely on kretek income have, on average, lower household wage income. These households are, therefore, not only heavily dependent on kretek rolling and vulnerable to the loss of a job in a kretek factory, but also suffer from relatively low wage income compared to households that diversify wage employment of household members.

Figure 4: Correlation between household wage income and proportion of kretek income



Source: Authors' calculations from kretek roller survey.

Figure 5: Contribution of different income sources to household total resource



Source: Authors' calculations from kretek roller survey.

Note: The percentage shares are weighted by the size of household.

Figure 6: Average household resources (Rp) by source and full-time (FT) work status of kretek workers

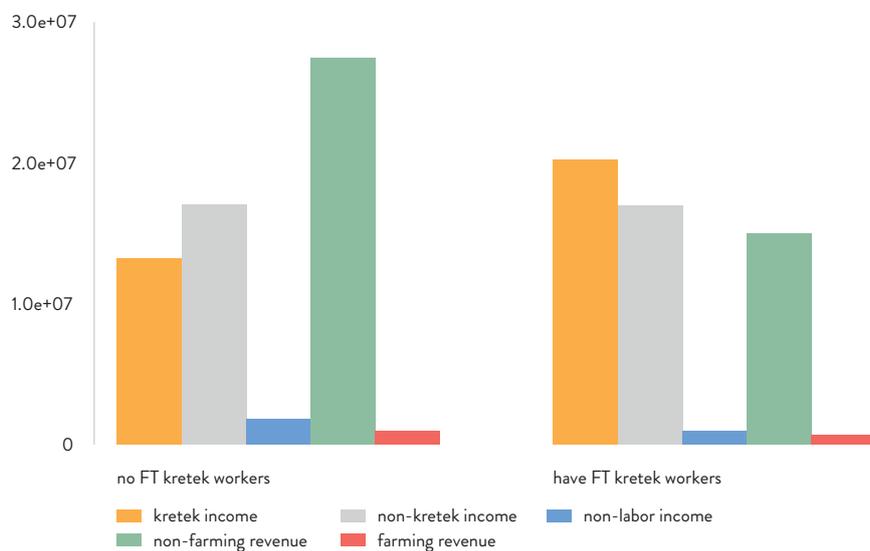
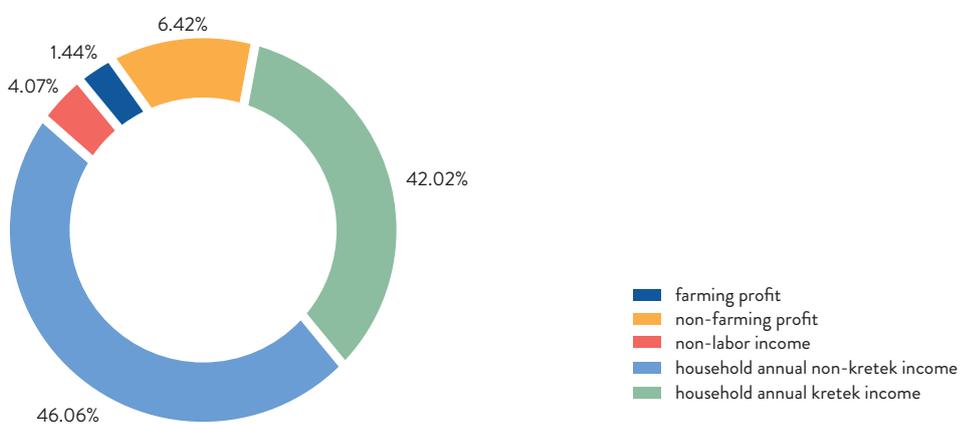


Figure 7: Contribution of different income sources to household total income



Source: Authors' calculations.

Notes: Household total income is the sum of wage income, gross margins from farm activities, gross margins from nonfarm activities, and nonlabor income. The percentage shares are weighted by the size of household.

Kretek households rely mainly on wage income and nonfarming revenue to derive household resources. As shown in Figure 5, the largest share of household resource (40%) comes from nonfarm revenue. The households with kretek workers who work less than full-time in the kretek industry, on average, earn higher nonfarm revenue compared to the households with full-time kretek workers (Figure 6). Kretek wage income contributes about 27% and non-kretek wage income contributes about 29% of household total resource. The contribution of nonlabor income and farming revenue is quite small, only 4.1% of a household's total resource.

The contributions of different sources change dramatically when the costs of production in farm and nonfarm activities are considered to calculate household total income (Figure 7). The contributions of nonfarm activities reduce to 6.4%. The contributions of kretek wage income and non-kretek wage income, on the other hand, increase to 42% and 46% respectively. Thus, total wage income accounts for the bulk (88%) of household total income. In order to reduce the heavy reliance of kretek households on the kretek industry for their livelihoods, their household income composition needs to be diverted to nonwage sources such as profitable nonfarm enterprises and nonlabor income, which in turn calls for educating and training of kretek workers in new skills.

Table 9: Determinants of poverty status among kretek households

DEPENDENT VARIABLES:	1: 1 IF NEED CREDIT	2: HAVE OUTSTANDING LOAN	3: TOTAL LOAN (LOG)
Years of schooling of household	-0.003 (0.006)	0.007 (0.006)	0.087 (0.084)
Household size	0.002 (0.019)	0.003 (0.019)	0.260 (0.269)
Number of dependents <15	0.080*** (0.029)	-0.002 (0.030)	0.494 (0.434)
1 if head of household is female	-0.000 (0.061)	-0.035 (0.062)	-0.561 (0.913)
Proportion of income from kretek	0.000 (0.001)	0.002** (0.001)	0.017* (0.010)
Observations	2,838	2,838	2,838
Number of clusters	720	720	720

Source: Authors' calculations from kretek roller survey.

Note: Standard errors are clustered at the household level. The signs *, **, and *** indicate significance at 10%, 5%, and 1%, respectively. The coefficients in Column 1 and 2 indicate average marginal effects.

About 54% of kretek households reported taking a loan in the past year, and about 66% of kretek households reported having outstanding loans. The average amount of loan taken by kretek households is Rp 11.3 million, and the average amount the households owe including interest is Rp 14.7 million. On average, the amount of new loans is equivalent to 31% of household total resource, while the outstanding loan in the past year is equivalent to 41% of household total resource. More than a quarter of the loans are used to finance consumption of daily needs. This suggests that kretek households face a liquidity constraint or irregular income flow. Among the kretek workers who used loans for daily needs, 82% are contract workers. Apparently, the presence of a contract in kretek industry employment does not mitigate the liquidity constraint. Another major use of the loans is for financing purchase of a vehicle (16%) and schooling (13%).

The most reported sources of loans are tobacco companies (16.2%), relatives (16.1%), and micro-finance institutions (15%). Almost 93% of the loans taken from the tobacco companies were interest bearing. The other two major sources of loans are commercial banks and local money lenders. Most of the loans taken from relatives, neighbors, or fellow farmers are interest free.

Households with a higher proportion of kretek income are more likely to have outstanding loans and tend to have larger amounts of outstanding loans (Table 9). This result can be explained by the fact that these households have lower wage income and are more likely to be poor. Lastly, households with more dependents need credit to meet the basic needs. However, female-headed households are not at a higher risk of having an outstanding loan.



5

POTENTIAL IMPACTS OF HIGHER TOBACCO TAXES ON KRETEK HOUSEHOLDS

In the current agenda of improving the tobacco tax system as part of strengthening tobacco control in Indonesia, increase in cigarette excise tax would have to be accompanied by simplification of the multitiered tax structure. Currently Indonesia has a 12-tiered specific excise tax system for hand-rolled kreteks, machine-made kreteks, and white cigarettes. The current system favors relatively cheap hand-rolled kreteks by offering lower tax rates. On the one hand, it offers affordable products to the young and potential smokers encouraging smoking initiation; on the other hand, it makes a cheaper option for current smokers to switch down to in the event of price increase. A desirable tax reform would gradually unify the tax rates and reduce the price gap between different types of cigarettes. With the current tiered tax structure benefiting hand-rolled kretek manufacturers, the required tax and price increases would not be uniform across all types. More specifically, the tax increase would be proportionately larger at the lower end for hand-made kreteks.

In this section, we run simulations to measure the potential impacts of such reforms in the cigarette excise tax policy on the livelihood outcomes of handmade kretek rollers. This effect should be interpreted in isolation from the negative effects on handmade kretek rollers' employment that is already in place due to the rise in demand for machine-made kreteks relative to handmade kreteks. The growth in cigarette production over the past decade from 235.5 billion sticks in 2005 to 342 billion sticks in 2016 has been dominated by the upward trend in the demand for machine-made kreteks (World Bank, 2017a).

The rise in machine-made kretek sales partly reflects shifting consumer preference from traditional hand-rolled kreteks to machine-made kreteks, spurred by high income growth of the Indonesian population. From 2005 through 2015, the annual per capita gross domestic product (GDP) growth in Indonesia ranged from 3.3% to 5%.² Without matching increases in the real price of tobacco products, this income growth is expected to not only boost the demand for tobacco products, but also lead smokers

² IMF, World Economic Outlook Database, International Monetary Fund, April 2017.

to switch upward to more appealing and higher priced tobacco products. The declining trend in the demand for hand-rolled kreteks and loss of employment in this sector may also be attributable in part to the mechanization of kretek production and the switching of producers to more efficient technology. The effects of these factors have not been considered in the current simulation.

The policy scenario deemed for cigarette excise tax reform in the report, *The Economics of Tobacco Taxation and Employment in Indonesia* (World Bank, 2017a), is summarized in Table 10. We considered two criteria for determining the desired tax increases at varying rates for different categories of cigarettes: (i) the minimum tax increase required to induce increase in cigarette price that would keep the affordability of cigarettes from increasing, and (ii) the disproportionately larger tax increases for the categories with lower tax rates that would help bridge the price gap between different categories of cigarettes and reduce the number of tax tiers.

Table 10: Proposed cigarette tax increase and new cigarette excise tariffs

TYPE	A: TIER	B: CONSUMPTION (BILLIONS OF STICKS)	C: EXCISE TARIFF 2017 (RP)	D: BASE REVENUE (BILLION RP)	F: PROPOSED TAX INCREASE (%)	H: NEW TARIFFS (RP)
Machine-made kretek (SKM)	I	212	530	112,360	12	594
	IIA	17	365	6,205	40	511
	IIB	21	335	7,035	53	511
Hand-made kretek (SKT)	IA	13	345	4,485	16	400
	IB	40	265	10,600	51	400
	IIA	5	165	825	21	200
	IIB	5	155	775	29	200
	IIIA	5	100	500	100	200
	IIIB	7	80	560	150	200
White cigarettes (SPM)	I	16	555	8,880	10	611
	IIA	2	330	660	30	429
	IIB	2	290	580	48	429
Total		345		153,465		

Source: Authors' calculations.

We estimate that the desired tax increase will reduce employment in the tobacco manufacturing sector by 0.43%. This implies a reduction of 2,914 tobacco manufacturing jobs, including 2,245 jobs (0.22%) in the handmade kretek industry.

This estimate is based on the price elasticity of demand for cigarettes and the employment elasticity of output in the kretek industry calculated in *The Economics of Tobacco Taxation and Employment in Indonesia* (World Bank, 2017a). To estimate the effects of raising tobacco taxes on kretek households' livelihoods, we use the following procedure. First, we randomly select kretek workers in the survey sample so that on average 0.22% of them lose their job. Second, we calculate the effect of losing the kretek-rolling job on household total wage income, household total income, household total resource, and poverty status. For kretek workers who lose their job, we calculate their households' post-kretek wage income, total income, and total resource. Then, we calculate the percentage changes of these variables. We also identify whether the poverty status of their households changes after losing their jobs. Note that the results of the calculation depend on which worker is "randomly" chosen to be laid off. To address this concern, we draw the sub-sample of laid off workers and simulate 1000 times. Table 11 reports the results of the simulations in 776 cases where some positive number of workers are laid off randomly.

Table 11: The simulated impacts of cigarettes excise tax reform on the livelihood of handmade kretek workers

	SIMULATIONS	MEAN	SD	MIN	MAX
Share of laid-off workers, %	776	0.276	0.18	0.035	1.38
Change in wage income, %	776	-50.27	23.37	-100	0
Change in household resource, %	776	-38.82	20.14	-100	0
Change in household income, %	776	-41.89	20.08	-100	0
Change in poverty level (resource), US\$1.90 PPP, %	776	0.049	0.076	0	0.422
Change in poverty level (resource), Rp 330,776, %	776	0.064	0.087	0	0.458
Change in poverty level (income), US\$1.90 PPP, %	776	0.060	0.087	0	0.528
Change in poverty level (income), Rp 330,776, %	776	0.077	0.098	0	0.564

Source: Authors' calculations.

Note: Since the share of laid-off workers is quite low, 0.22%, then there are cases in the simulations with no kretek workers laid off. We discard those cases from the simulations.

On average, the simulations suggest that the loss of jobs will be 0.22%, which is quite low. For kretek workers who lose their jobs, their households would experience a decrease in wage income by about 50%, in household resource by about 39%, and in household income by about 42%, due to the loss of jobs of 0.22% workers. The decrease in wage income is estimated to be higher at 50%. However, households have other income sources such as farm and nonfarm resources. Thus, the estimated drops in household resources and income are still lower than the estimated drop of wage income.

Some of the affected households, particularly those without a significant support from nonwage income, would plunge into poverty. The higher tobacco taxes are estimated to increase poverty among kretek households by about 0.04% to 0.06%, depending on the definition of poverty. The negative tobacco tax impacts on households' livelihoods call for government support for social safety nets for these households.

The total income loss from the reduction in employment in the handmade kretek industry is, however, minimal compared to the revenue gain from the tax increase.

The simulation in *The Economics of Tobacco Taxation and Employment in Indonesia* (World Bank, 2017a) paper based on the policy scenario in Table 10 estimates that the annual revenue gain would be Rp 10,915 billion (Table 11 in *The Economics of Tobacco Taxation and Employment in Indonesia* (World Bank, 2017a)) and the employment loss in the handmade kretek industry would be 2,245 (Table 12 in *The Economics of Tobacco Taxation and Employment in Indonesia* (World Bank, 2017a)). Given the mean annualized kretek income at Rp 15,500,000 and the projected decrease in wage income by 41%, the loss of 2,245 jobs in the kretek industry **would imply total income loss amounting to Rp 14.3 billion, which is approximately 0.1% of the annual revenue gain.** This is a win-win policy change because the tax and price increase will not only reduce tobacco use and related health costs, it will generate additional revenue which can more than compensate for the income loss due to a reduction in production and employment in the kretek industry.



6

CONCLUDING REMARKS

While pervasive use of tobacco and the growing number of smokers have been a long-standing public health issue in Indonesia, the relatively low prices and tax rates of hand-rolled kreteks pose an added challenge for policymakers in curbing the epidemic. Hand-rolled kreteks continue to be an affordable product for poor individuals. Since these individuals receive government subsidized health insurance, the government of Indonesia would see an increasing burden of health care costs of these individuals in the near future. Besides, young individuals are more likely to purchase cheap hand-rolled kreteks. This encourages smoking initiation which will further raise the already high smoking prevalence among youth. Under these circumstances, raising the tax of hand-rolled kreteks to push the price beyond the affordable range of the poor and youth population is a policy priority.

The policymakers have, however, faced the dilemma that raising the tax and price of hand-rolled kreteks with the overarching goal of simplification of cigarette excise tax structure can reduce the demand for hand-rolled kreteks so much that it would imperil the livelihood of the kretek worker community. There are currently an estimated 307,793 workers employed in the hand-rolled kretek industry and 1.2 million household members dependent on them, who are potentially at risk of being adversely affected by the tax reform. The findings from the current study suggest that apprehension about the social costs associated with the potential job loss is largely overstated.

The total income loss from the reduction in employment in the handmade kretek industry from the desired tax increase is minimal compared to the revenue gain from the tax increase. We estimate that in total around 2,245 kretek workers would lose their jobs as a result of the tax and price increase and the reduction in kretek consumption and production. The total income loss of kretek workers would be approximately Rp 14.3 billion, which is merely 0.1% of the annual revenue gain of Rp 10,915 billion resulting from the tax increase. This is a win-win policy change because the tax and price increase will not only reduce tobacco use and related health costs, it will generate additional revenue which can more than compensate for the income loss due to reduction in production and employment in the kretek industry.

We can draw two major policy recommendations—one for immediate action and the other for longer term planning—based on the findings of this report.

- » **The most vulnerable groups in the affected population who would need immediate income support in the event of job loss include the workers who are less educated, older, heads of their households, and contribute a significant proportion of total household income from kretek rolling.** Nearly half of the kretek workers had different occupations and market skills prior to working in a kretek factory, which indicates their resilience to make a transition to a different job in the event of job loss in the kretek industry. Besides, kretek workers are predominantly female, who not only value the wage premium, benefits and long-term employment opportunity in the kretek industry over other comparable sectors, but also prefer the flexibility of work hours in the kretek industry that offer them the opportunity to balance responsibilities between work and home-based nonmarket activities (including child rearing and household chores). It suggests that the female kretek workers can be incentivized to re-skill and move to home-based nonfarm enterprises that would have similar appeal to their preference for work-life balance.
- » The government (Ministry of Finance and Ministry of Social Affairs) should provide temporary income support using the existing Social Assistance programs (such as the unconditional cash transfer program, Bantuan Langsung Sementara Masyarakat - BLSM) and identify alternative employment or income-generating opportunities in the affected regions. The re-training of laid-off kretek workers should be designed to accommodate transitions into these alternative employment opportunities.

In addition to government interventions, national and international nongovernmental organizations can introduce targeted training and micro-credit programs to help the laid off kretek workers acquire new skills and finances to invest in nonfarm self-employment generating activities that they prefer to run from home.

The merit of this study lies in its focus on the kretek workers' livelihood options that led to the above-mentioned policy direction needed to tackle the unintended employment consequences of the desired tax reform in Indonesia. The study is not

free from its limitation though. All the households included in the survey have at least one kretek worker. This sample selection criterion limited our ability to assess the socio-economic status and labor market outcomes of kretek households in comparison with the rest of the population. However, we do make the observation that kretek households are no more or less likely to be poor than those who are not dependent on the kretek industry for their livelihood.

The vulnerability of kretek households to job loss can hardly be overemphasized.

It can even be discounted for the households which have multiple earners in different occupations besides kretek rolling. Because these households have diversified income sources, they have the capability to absorb transitory income shocks owing to the structural decline of one of those sources. In a broader macroeconomic framework, the reduction in demand for kreteks would be matched by increased demand for other goods and services in the thriving sectors, which will eventually provide new and alternative sources of employment for the displaced kretek workers in the long run. Moreover, for a growing economy like in Indonesia, the growth in employment in new sectors can more than offset the decrease in employment in the handmade kretek industry. The reform in cigarettes excise tax policy can be reasonably viewed as a way forward for diverting resources away from the goods that cost the health and welfare of the nation and toward the goods that contribute to a healthier population and higher standard of living.

REFERENCES

Ahsan, A., and Wiyono, N. (2007) *An Analysis of the Impact of Higher Cigarette Prices on Employment in Indonesia*.

World Bank (2017a). *The Economics of Tobacco Taxation and Employment in Indonesia*. Indonesia Tobacco Employment Studies. World Bank, Washington, DC.

World Bank (2017b). *The Economics of Tobacco Farming in Indonesia*. Indonesia Tobacco Employment Studies. World Bank, Washington, DC.

World Bank (2017c). *The Economics of Clove Farming in Indonesia*. Indonesia Tobacco Employment Studies. World Bank, Washington, DC.

Appendix A: Methods of Data Collection

This study applied a mixed method to analyze the socioeconomic and labor market characteristics of Indonesian kretek workers and their households. First, we surveyed a sample of kretek workers in Kudus and Malang to understand their socioeconomic characteristics, labor market outcomes, and alternative livelihood options than the kretek industry. Second, we conducted focus group discussions (FGDs) among a subsample of kretek workers in Kudus. In total, we performed two FGDs among 14 female kretek workers. The FGDs aimed to complement the survey data by eliciting contextual information not captured by the quantitative survey and by clarifying issues that weren't sufficiently explained by the survey.

Sampling and Survey

The survey of kretek workers was based on a multistage clustered sampling procedure with the target population of production workers employed in the kretek industry. Central Java employs 42% of all kretek workers, followed by East Java (40%). We selected the top employing district in each province: Kudus in Central Java, and Malang in East Java. Out of the 92 districts listed in the 2014 Annual Survey of Manufacturing where kretek factories were located, Kudus in Central Java was the number one employer (14.75% of total employees in kretek), followed by Temanggung, also in Central Java (10.45%). Kabupaten Malang in East Java was third on the list (8.57%), but if combined with Kotamadya Malang (2.37%), they employ more than Temanggung. Thus Kudus from Central Java and Malang from East Java were selected as the two districts with the largest kretek worker population for conducting the survey on kretek workers.

The 2014 Annual Survey of Manufacturing Industry and the 2014 Annual Survey of Micro and Small Industry suggest that there are 57 kretek firms in Kudus (8% of total kretek firms in Indonesia) and 46 kretek firms in Malang (6.5%). In Kudus, 47 kretek firms are categorized as large firms while the rest of the kretek firms are categorized as medium firms.³ In Malang, 22 kretek firms are categorized as large firms while the rest are categorized as medium firms. Kretek workers in Kudus accounted for 40% of total kretek workers in Indonesia, while kretek workers in Malang (including those in Kotamadya Malang) accounted for 10.94% of total kretek workers.

The kretek factories located in these two districts were used as a proxy for clusters (neighboring villages) where kretek workers are expected to reside. Thus, 20 factories in Kudus and 20 factories in Malang were selected as clusters. It can be seen from Table A1 that all the kretek factories from Malang and all the kretek factories in Kudus

³ Firms that employ 1–4 workers are categorized as micro firms, 5–19 workers as small firms, 20–99 workers as medium firms, and more than 99 workers as large firms.

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Table A1: Number of factories and sample clusters (kretek factories)

KUDUS			MALANG	
NUMBER OF WORKERS	NUMBER OF FACTORIES	SAMPLE CLUSTERS	NUMBER OF FACTORIES	SAMPLE CLUSTERS
50-150	7	7	7	7
151-500	5	5	6	5
>500	8	8	37	8
Total	20	20	50	20

employing less than 500 workers were covered by the sample clusters. For the large factories in Kudus employing over 500 workers, a sample of 8 clusters was selected out of 37 factories in the district. To ensure targeted sample size per cluster, only factories employing above 50 workers (medium and large factories) were listed for the selection of clusters.

We first aimed at getting the sample size per cluster at 23 production workers. This size is expected to provide more stable variances within clusters. With this sample size per cluster, we had to exclude factories with workers fewer than 23 workers. In fact, we aimed to exclude factories with workers fewer than 50 workers for several practical reasons. First, it would be easier to get the sample of 23 workers out of 50 rather than the same size of sample from a factory with 30 workers. This also minimizes the chance of replacing factories or adding more workers in the field when a selected factory has production workers fewer than 23.⁴ Second, from the survey perspective, it is always better to target a sample from relatively large clusters. While the rule of “50” workers is arbitrary, this helped us in reducing the number of clusters while information loss from smaller firms might be minimal. Besides, the factories employing above 50 workers are presumed to have similar technologies and can differ systematically in terms of production capacity from those employing below 50 workers. However, in the survey we did pick 18 kretek workers who reported that the factories where they worked employed less than 50 workers.

In each sample cluster (neighboring village of a factory), we obtained the list of all sub-villages (dusun). The sub-villages were chosen randomly as the primary statistical units (PSU) that usually had 90–120 households each. In each sub-village, we met the village head to get a complete list of kretek workers in the area. Using this method, kretek workers employed in small factories were covered in addition to those working in medium and large factories.

⁴ Although we get the number of workers for each factory from the agricultural census, the data may be measured with error.

In the next stage, we visited the listed households with kretek workers in sub-village 1 to confirm that the households have at least one kretek worker and inquired if they were aware of anyone else who were kretek workers. After the enumeration was complete in sub-village 1, we randomly selected the minimum number of kretek workers (23) targeted for the sample from each cluster. If the available number of kretek workers in sub-village 1 fell short of the targeted number from a cluster, we went to sub-village 2 to repeat the same process.

The survey team approached 757 households in total and found 735 households (97%) reporting at least one kretek worker in the household working full-time or part-time in the kretek industry. It indicates the targeting of the sample was very accurate. Out of the 735 eligible households, 720 households agreed to be interviewed, showing a 98% response rate. The final sample contains 18–22 households from each cluster. The respondents from each household, except one, were female and all of them were kretek workers. Given the sampling method described above, the kretek households covered in the sample are representative of the kretek population in the two kretek producing districts, Kudus and Malang. We are unable to classify the factories into Class I, II or III categories because kretek workers do not have information on the scale of production of the factories where they were employed.

The survey was conducted during October–November 2016 by SurveyMeter. A household level questionnaire was used in a face-to-face interview of kretek workers, which lasted for about an hour. The demographic and socioeconomic characteristics of kretek rollers and their household members are summarized in Table A2.

Written or verbal consent was obtained from the respondents prior to the interview. The confidentiality of data is maintained by separating the identifying information of the respondent from the rest of the data file. The study was approved by the Institutional Review Board (IRB) of the Morehouse School of Medicine, the IRB record for the American Cancer Society and SurveyMeter.

Focus Group Discussion

The quantitative data collected through the sample survey was complemented by the qualitative data collected through two Focus Group Discussions (FGD) conducted on two groups of female kretek workers (7 in each group) in the district of Kudus in March 2017. The average age of the participants was 44 years (minimum 27 and maximum 61 years) and average tenure in the kretek industry was 21 years (minimum 3 and maximum 48 years), longer tenure generally corresponding to older age. They did not have any formal occupation prior to working in the kretek factory. All of them were housewives taking care of children and other household chores. Only five of them were engaged in embroidery.

Table A2: Summary statistics of kretek workers and their household members

VARIABLES	ALL HOUSEHOLD MEMBERS	KRETEK WORKERS				
	Mean	Mean	SD	Min	Max	N
Age	31.00	40.06	9.70	16	73	794
1 if female	0.53	0.94	0.24	0	1	794
1 if head of household	0.25	0.15	0.36	0	1	794
1 if younger than 15	0.25	0.00	0.04	0	1	794
1 if married	0.53	0.83	0.37	0	1	794
1 if attained no schooling	0.12	0.03	0.17	0	1	794
1 if attained elementary education	0.44	0.55	0.50	0	1	794
1 if attained junior high education	0.23	0.27	0.45	0	1	794
1 if attained senior high education	0.20	0.15	0.35	0	1	794
1 if attained Diploma I, II, or III	0.00	0.00	0.05	0	1	794
1 if attained college degree	0.01	0.00	0.00	0	0	794
Years of schooling	5.81	6.77	3.25	0	14	794
1 if spouse works	0.84	0.82	0.38	0	1	794
1 if works in kretek industry	0.49	1.00	0.00	1	1	794
1 if production worker	0.57	0.96	0.19	0	1	794
1 if casual worker	0.24	0.00	0.04	0	1	794
1 if have a contract	0.48	0.79	0.41	0	1	794
Tenure (months)	162.48	214.65	128.47	1	593	791
Hours worked in the past week	42.11	39.61	13.76	6	84	793
Total working hours in past year	1,060.5	1,798.7	724.3	0	5,904	794
1 if receive daily payment	0.36	0.47	0.50	0	1	794
1 if receive weekly payment	0.50	0.50	0.50	0	1	794
1 if receive monthly payment	0.14	0.03	0.16	0	1	794
1 if task is rolling, filling, or cutting		0.63	0.48	0	1	720
1 if task is packing or ticketing		0.32	0.47	0	1	720
Kretek rolled per day (in sticks) 3		2782.92	1000.14	200	5,000	508

Table A2: (CONT.)

VARIABLES	ALL HOUSEHOLD MEMBERS	KRETEK WORKERS				
	Mean	Mean	SD	Min	Max	N
Kretek rolled per day (in sticks) ³		2,782.92	1,000.14	200	5,000	508
Kretek rolled per day (in packs) ¹		1,811.52	1,804.07	60	10,000	151
Kretek rolled per day (in <i>slop</i>) ²		949.87	1,493.74	6	4,400	60
Target set by company (in sticks) ³		2,821.62	1,017.67	98	5,000	493
1 if excellent health		0.05	0.21	0	1	794
1 if very good health		0.11	0.31	0	1	794
1 if good health		0.55	0.50	0	1	794
1 if fair health		0.27	0.44	0	1	794
1 if poor health		0.03	0.17	0	1	794
1 if ill in the past 30 days		0.36	0.48	0	1	794
Illness days in the past 30 days		6.16	8.99	0	98	794
Days stopped activity due to illness		1.82	3.59	0	30	794
Hourly wage in Rp		7,854.39	5,249.93	875	35,294	791
1 if working full time		0.32	0.46	0	1	794
Full Time Equivalence (FTE) ratio ⁵		0.80	0.23	0	1	794

Note:

1. There are about 10 or 12 sticks per pack of kretek cigarettes.
2. There are 10 packs of kretek cigarettes in a *slop*.
3. We trimmed the top 5% of reported kretek sticks rolled per day.
4. A worker works full-time if they reported working at least 2,000 hours in the past year.
5. The weight for full-time workers is 1. The weight for less than full-time workers is the ratio of total working hours in the sector divided by 2,000 hours.

Appendix B: Calculation of Total Household Income and Resource

The data on wage income were collected for each household member by primary and secondary jobs. Household wage income is the sum of each member's annualized wage income from both primary and secondary jobs. The components used in the calculation of each member's annualized wage income are the annual working hours and the reported wage. We use a similar approach to calculate annualized household income from kretek rolling.

Data on annual farm income, nonfarm income, and nonlabor income were collected at the household level. We use these data to calculate total household income and household resource. There are two sources that determine the farm and nonfarm resource. The first source is the revenue from the sale of products from farm and nonfarm activities. The second source is the market value for the home-grown products used for household consumption. The farm and non-farm resources were then added to household wage and nonlabor income to obtain total household resource.

Total household income, on the other hand, is measured by the sum of household wage income, nonlabor income, and gross margins from farm and nonfarm activities. We first calculate total revenues and costs from farm and nonfarm activities to obtain the gross margins. The total revenue is the market values of the sale or household consumption of products from farm and nonfarm activities. The total costs include household expenditures on hired labor, raw materials, and other operational costs. Total household income is a better measure of household well-being. The variable reflects the amount of resources available for household consumption after taking into account household production costs incurred in farm and nonfarm activities.



