

SOCIO-ECONOMIC CONTRIBUTION OF ILLEGAL CHAINSAW MILLING TO THE GHANAIA N RURAL ECONOMY

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ABSTRACT

The search for viable alternatives to illegal chainsaw milling in Ghana requires an understanding of the anthropogenic factors in the rural economy that promotes the practice. This paper investigated the benefits of the practice to the rural economy of Ghana. Data was obtained from survey conducted on 102 chainsaw lumber stakeholders using questionnaire across 8 forest districts in southern Ghana and analyzed descriptively. Results showed that the practice contributes to the provision of employment, community infrastructure among others. More than 50% of chainsaw operators earned up to 97% of their household income from the practice, and thus considered it as the best alternative to agricultural income. Farmers, land owners and traditional authorities received eight categories of informal payments from chainsaw operations. These included payments from sale of trees, commission on trees scouted for logging and compensation for crop damages on farmlands during logging. Also, taxes were paid at community barriers to enable passage of processed lumber to the market. Illegal chainsaw milling was found to be lucrative. This coupled with operators conniving with rural communities and the limited supply of sawmill lumber to the domestic market poses major challenges to eliminating the practice. To minimize the chainsaw menace to curtail revenue loss to the state, sustain livelihoods and forest resources, there is need to provide fiscal incentives to encourage regular mills to supply adequate lumber to the domestic market. Rural youth must be supported to establish commercial short rotation timber and fuelwood plantations. Also, equitable distribution of tree benefits to resource owners especially farmers must be ensured.

Keywords: Forest crimes, illegal logging, forest governance, Ghana domestic timber market, inequitable benefit sharing

INTRODUCTION

Commercial chainsaw lumber production in Ghana has been in existence for well over three decades, particularly in the forest areas in southern Ghana (Amanor, 2006). Until the ban, that lead to its criminalization in the 1990's, the practice was legal and employed well organized groups of the youth in these areas. The practice has reliably supplied timber to the domestic market since the 1970's, when legal timber firms failed to satisfy

domestic demand for lumber due to the recession or decline in the Ghanaian economy in those years. Even in its criminalized state chainsaw lumber production is currently the major supplier or source of lumber to the domestic market, accounting for about 76% of lumber stocks by volume (TIDD/FORIG, 2009). This represents an increase of 6% over the 70% reported in an earlier study by Odoo (2005). Consequently, chainsaw lumber is widely sold and used for construction purposes and furniture production throughout the

country including government projects (Kyeretwie, 2006). Apart from filling the wood deficit gap on the domestic market as a result of the inadequate supplies from regular mills, the sale and distribution of chainsaw lumber generates some un-estimated revenue in the form of market tolls, income tax, taxes from waybills and custom duties within the country and also through overland exports to neighbouring countries of Burkina Faso, Niger, Mali and Togo to the Ghanaian Government. The production of illegal chainsaw lumber and its associated trade also provide livelihoods to people in rural and urban areas. Indeed, illegal chainsaw lumber production can be described as a key livelihood activity and contributor to the incomes of households of those associated with the practice in rural areas aside farming. Despite the positive contributions, illegal chainsaw lumbering is reported to be destructive to the forest resource base. Moreover, the illegal transactions associated with the practice contribute to loss of revenue to the state (Pinard *et al.*, 2007). Annual loss in stumpage revenue from illegal sale of trees to chainsaw operators approximates to GHC 25 million (Marfo, 2010).

Although, both the positive and negative effects of illegal chainsaw lumbering are generally acknowledged, its illusive nature and associated complexity of livelihood implications have constrained the search for viable solutions for regulating the practice in the country. To facilitate the discourse on illegal chainsaw lumber production and marketing in the country, it is imperative to establish the magnitude of its contribution to the Ghanaian rural economy. Rural poverty affects 40% of the rural population in Ghana and rural unemployment rate is 20% (GSS, 2007). Moreover, the rural economy is largely dependent on seasonal rain-fed agriculture. Irregularity in rainfall pattern coupled with declining soil productivity in most rural communities in recent times has generally reduced crop productivity and farm incomes (Akon-Yamga

et al., 2010). Illegal chainsaw operations thus provide one of the most profitable supplementary income opportunities in some communities, particularly in the high forest zone of the country.

This research forms part of a larger study that was aimed at finding alternatives to illegal chainsaw milling in Ghana. This paper addresses two central questions, i.e. what is the magnitude of the socio-economic contribution of illegal chainsaw operations to the Ghanaian rural economy and what are the policy implications? Specifically, the monetary value of benefits derived from chainsaw operations by communities and those involved in the practice are estimated. The magnitude of the contribution of chainsaw lumber production to household budgets is estimated and the relationship between chainsaw milling and other livelihood opportunities in the rural economy assessed. The comparative advantage of chainsaw income over that of agriculture, a key alternative livelihood activity is also assessed. The magnitude of informal payments which represent loss in revenue to the state as a result of illegality but which is paid directly to farmers, community leaders and others for access to trees and conversion into lumber for the market is also estimated. Finally, some suggestions are made to inform policy decisions on the way forward for addressing the chainsaw menace in the country.

METHODOLOGY

Study Sites and Sample Selection

The study was conducted in 8 forest districts in the High Forest Zone of Ghana namely Juaso and Nkawie in the Ashanti Region; Assin Fosu in the Central Region; Gaoso and Sunyani in the Brong Ahafo Region; and Begoro, Oda and Kade in the Eastern Region (Figure 1). Respondents were identified for interviewing during initial dialogue meetings with chainsaw stakeholders in these

districts. Respondents were not sampled based on any formal sampling strategy. Those interviewed were stakeholders who were available and willing to grant audience during subsequent visits to their communities. Respondents were engaged in face-to-face interviews and comprised a total of 102 chainsaw lumber stakeholders. These included chainsaw lumber sponsors, chainsaw machine owners, chainsaw operators, lumber carriers/head porters; transporters of chainsaw lumber, small scale saw millers, village/community chiefs, unit

committee members and lumber dealers on timber markets in the study districts.

The distribution of respondents in the study districts is presented in Table 1. Unequal number of the respondents was interviewed. The illegality surrounding the chainsaw practice made it impossible to develop a sample frame for representative sample or equal number of respondents across the different strata of stakeholders. Only those who availed themselves could be interviewed.

Table 1: Distribution of the respondents across the 8 forest districts surveyed

Category of Respondents	Forest District and number of respondents								Total
	Assin Fosu	Begoro	Sunyani	Goaso	Kade	Oda	Juaso	Nkawie	
Chainsaw operator	3	8	5	4	2	2	0	2	26
chainsaw owner	0	7	2	4	2	1	5	3	24
Lumber carriers/head porters	3	2	3	1	1	7	0	3	20
Small scale saw miller	0	1	1	3	0	1	1	0	7
Lumber dealer	0	0	1	1	1	3	1	0	7
Transport owner/drivers	1	0	2	0	0	2	0	0	5
Chainsaw lumber sponsor	0	0	0	3	0	0	1	1	5
carpenters	0	0	0	1	0	2	0	0	3
Unit committee member	0	0	0	0	2	0	0	0	2
Farmer	0	1	1	0	0	0	0	0	2
Chief of village	0	0	0	0	0	1	0	0	1
Total	7	19	15	17	8	19	8	9	102

Source: Survey data, 2008

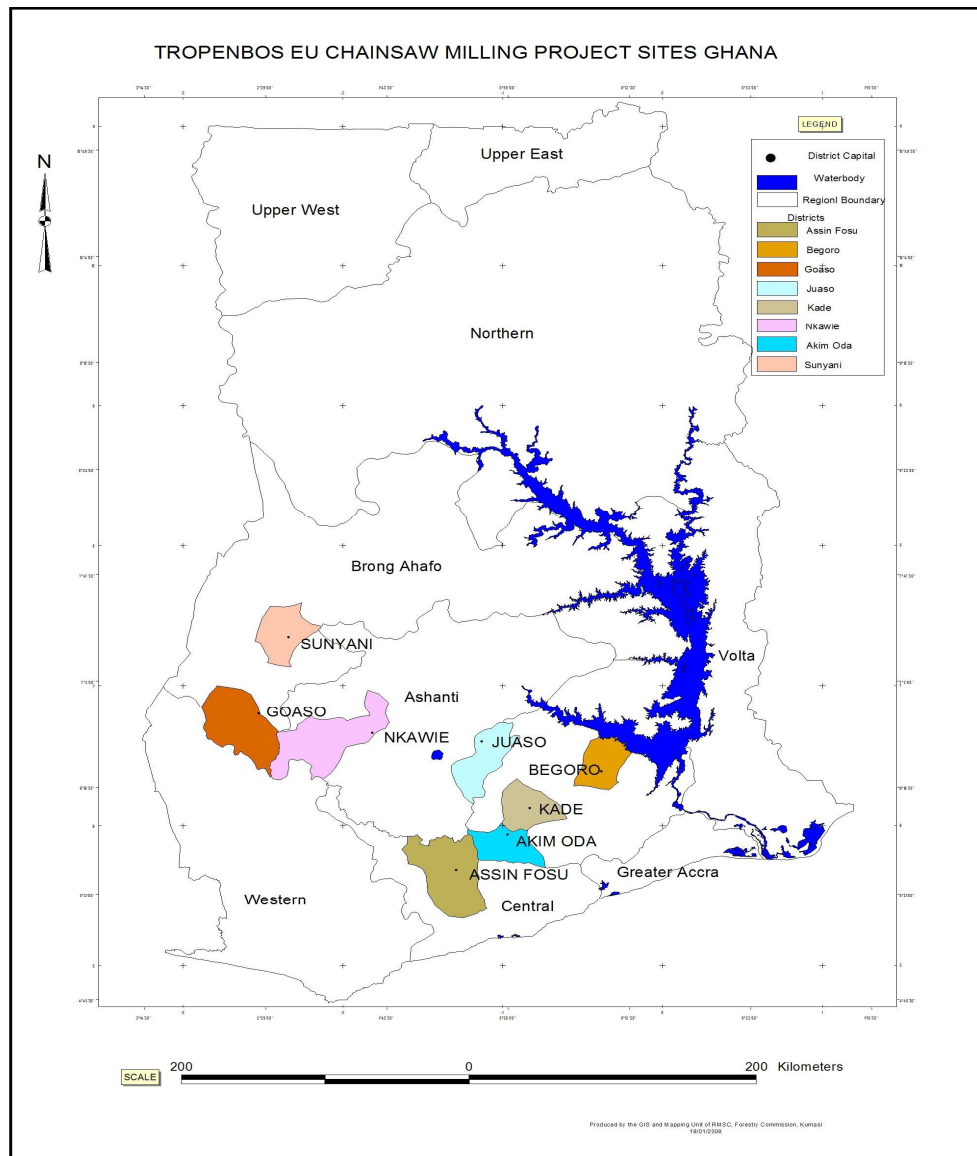


Figure 1: Map of Ghana showing study sites

Data Collection and Analysis

Structured questionnaires were employed in collecting data from the 102 chainsaw lumber stakeholders across 8 forest districts. The data collected included the economic benefits individuals and communities gained from chainsaw operations; total household incomes, other livelihood activities, cost and income streams from these activities and that from chainsaw operations among others.

The data was analysed descriptively with Statistical Package for Social Science (SPSS) and Microsoft Excel software and summarized using frequencies, percentages and bar charts. Net Income from Chainsaw (CI) and Net Income from Alternative livelihood activity in the rural economy (AI) were computed to estimate the comparative advantage of chainsaw milling in the rural economy using the ratio CI/AI . CI/AI is a simple ratio formulated by the authors. It is being used in this paper as a measure of relative profitability between chainsaw lumbering and other key household income generating activities, usually, farming. If $CI/AI > 1$ then chainsaw milling is more profitable than the alternative income and not profitable if less than 1 that is $CI/AI < 1$. If $CI/AI = 1$, then both chainsaw and the alternative livelihood activity are the same with respect to profitability. Thus, if the alternative activity is legal and not cumbersome to pursue, it could be promoted to replace illegal chainsaw milling to the benefit of the rural economy and the nation. The essence of this ratio is to inform policy decisions in the search for viable alternatives for illegal chainsaw milling in the rural economy.

RESULTS AND DISCUSSION

Economic Benefits Derived from Chainsaw Operations in the Rural Economy

Chainsaw operations generally offer a range of economic benefits to the rural economy in the forest districts surveyed (Figure 2). Marfo and Acheampong (2009) estimated that illegal chainsaw operations employ or provide jobs for over 100,000 people nationwide. In monetary terms, this study estimated that about 84% of chainsaw derived benefits or gains is in the form of employment for operators, tree hunters, lumber carriers, loading boys, dealers in chainsaw accessories, chainsaw repairers and machine owners who rent out chainsaws for income. Thus, in the rural areas, it contributes income mainly from earnings gained from undertaking chainsaw operations and related activities.

The magnitude of employment income or earnings by individuals engaged in the chainsaw lumber production process in areas surveyed, ranged from less than GH¢5,000 in Begoro to GH¢50,000 in the Sunyani forest districts at different time periods from 2004 to 2008 (Figure 3). The disparity in the trends of employment income reported across the forest district is as a result of the varied nature of work done by the different actors in the production process. Communities also benefited from taxes they imposed on chainsaw operations as well as provision of infrastructure such as bridges, dugout wells and lumber and other materials for community buildings. It must be noted that chainsaw milling creates invaluable employment opportunities in rural communities particularly during the off-season when spare labour abounds and when there are limited alternative income sources for households to rely on.

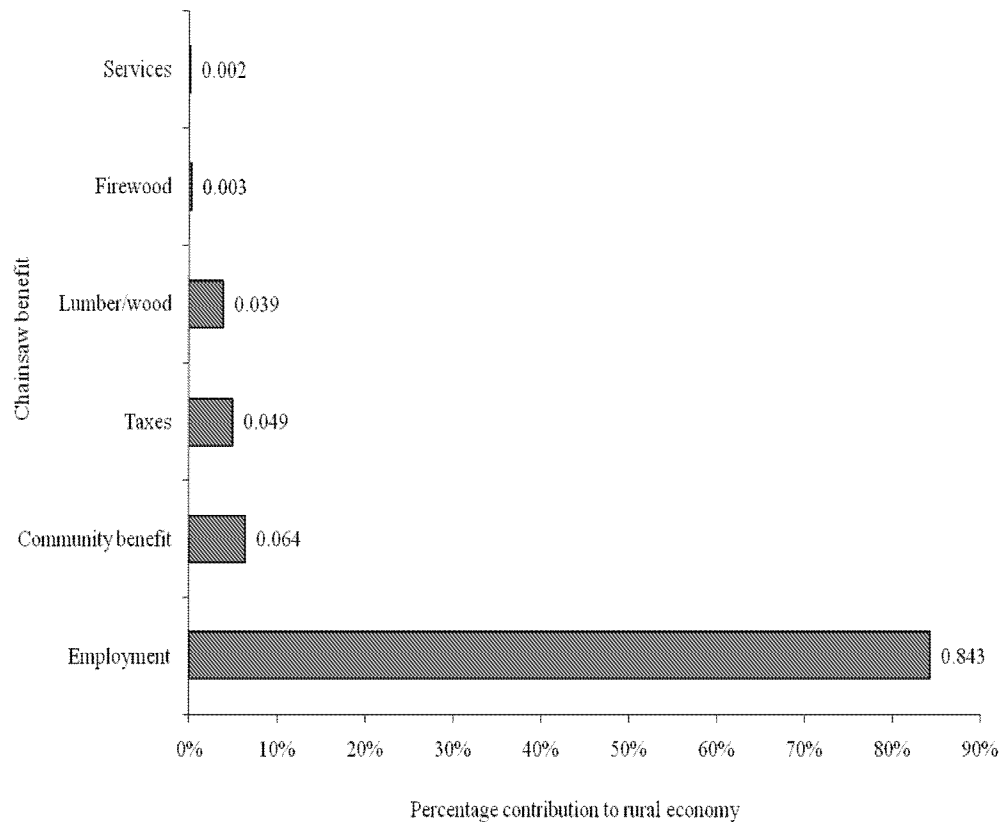


Figure 2: Economic contribution (%) of chainsaw lumber production to the rural economies in the study forest districts

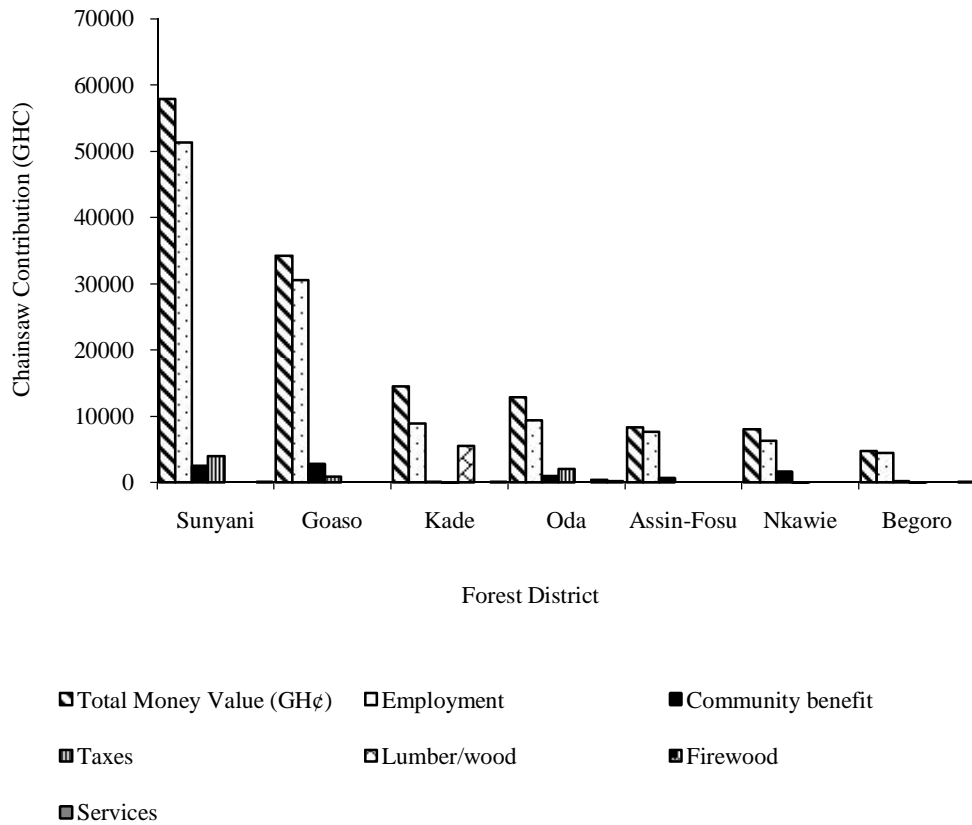


Figure 3: Monetary value of the contribution of chainsaw lumber production to study forest district from 2004 to 2008

Other Benefits to Farmers/Landowners and Traditional Authorities from Chainsaw Operations

Eleven different informal payments were made to various actors in the chainsaw commodity chain for access to trees, processing and conveyance to the market, (Figure 4). Eight out of eleven of these payments were made to resource owners (i.e. traditional authorities, landowners and farmers) in

rural areas. Three key of these payments were those made to landowners and traditional authorities for access to trees on lands in their local areas, tree sales by farmers and compensation for crop damages as a result of logging. Farmers regarded these compensation payments as benefits because under normal circumstances, little or nothing would have been paid by legal concessionaires.

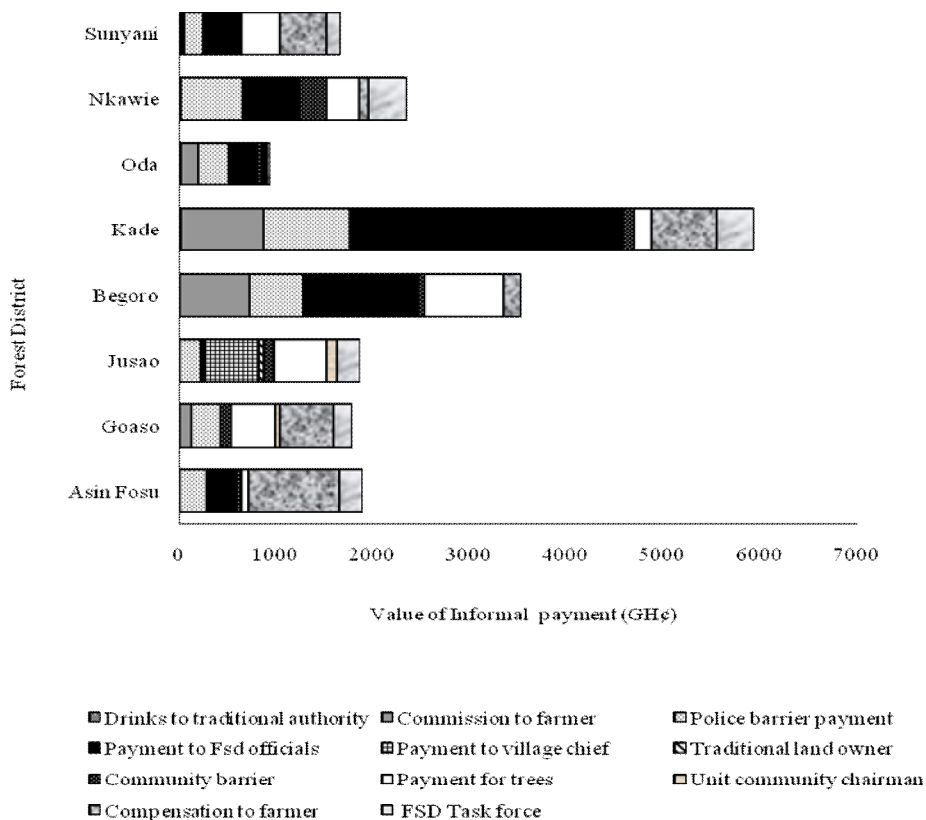


Figure 4: Magnitude of informal payments chainsaw operators made to actors in the chainsaw commodity chain in a single operation involving 240 trees in 2008

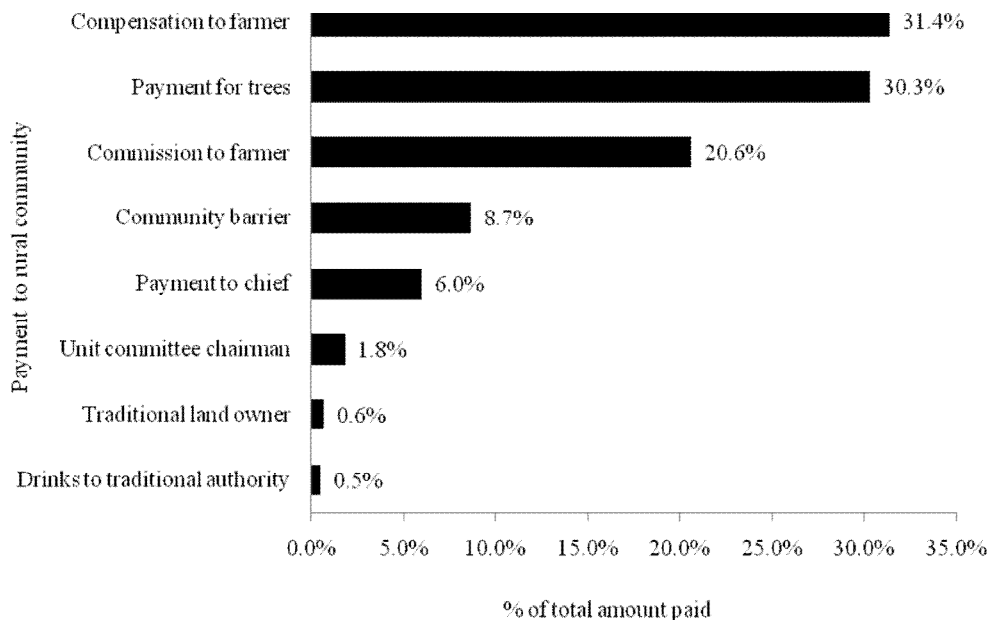


Figure 5: Percent distribution of informal payments among farmers/landowners and traditional authorities in a single operation of 240 trees in 2008

Figure 5 shows the percent share of the range of payments from chainsaw operations among resource owners in a single operation involving 240 trees in 2008. The total cash paid to resource owners in this single operation in 2008 totalled approximately GH¢9,500. This constitutes 47% of the total informal payments generally made in procurement, processing and haulage of illegally sawn lumber to the market. The other 53% was paid to law enforcement agents.

Although the Forestry Commission (FC) pays royalties to traditional resource owners and stools, this amount usually goes directly to paramount chiefs of the traditional areas. The paramount chief has the prerogative in the distribution of this forest revenue to his subjects. In some areas, local

communities apply for some of this fund for community infrastructural development (schools, toilet facilities, etc.). The local traditional leadership may not gain directly; neither does the farmer gain directly from the pooled earnings. Payments farmers received from compensation to crop damages constituted 31.4% of the total cash paid to them from tree transactions with chainsaw operators. Those from sale of trees and commission on trees harvested are 30.3% and 20.6% respectively (Figure 5). Amounts paid per tree sold varied greatly with species and dimension. A mean of GH¢12.0 was recorded at the time of investigation in 2008. Hansen (2010) recorded a mean price of GH¢ 5.0 and GH¢ 38.0 per tree for low and high value species respectively between 2007 and 2008. These

monies are significant to farmers and could have been lost to their families if the trees were harvested by a legal concessionaire.

Counsell (2007) reported that due to corruption or failure of government regulations, local communities in Cameroon have direct incentive to engage in or support illegal logging activities and able to earn as much from direct compensation payments from illegal loggers as they could potentially earn from legal logging. Generally, in Ghana, the lack of clear tree tenure in off-reserve areas and conflicts associated with compensation payments by timber concessionaires for crop damages on farms, are disincentives to tree planting and protection (Marfo and Sanhaz, 2009). Consequently, many land owners and farmers would rather negotiate secretly with chainsaw operators to have the trees on their land illegally harvested than allow legitimate concessionaires to harvest the trees and pay token compensation (Schmithüsen, 2006). Thus, unless the laws are modified, farmers and land owners will continue to collaborate with illegal operators to plunder forests and tree resources. In most cases negotiations are made between farmers and chainsaw operators without any payment to the traditional authorities. In such situations both the state and traditional authorities fail to benefit from fees and taxes for local area development. On the other hand payment for trees may be evaded by chainsaw operators, in which case farmers also loose out on money or lumber.

The Relationship Between Chainsaw Operations and other Rural Livelihoods

Livelihoods of the Rural Economy

Rural economies in Ghana are usually characterized by a number of small businesses or enterprises that generate income to supplement income from agriculture, the major occupation and

source of livelihood. Usually, engagement in carpentry, masonry, painting, tailoring, transport services, agro-processing, wood carving and trading in both agricultural and non-agricultural commodities as off-farm enterprises prevail. Obiri (2003) reported that at least 30% of people in rural communities in the forest zone of Ghana may be involved in these activities for supplementary income with the majority (70%) relying only on agriculture for survival. Businesses that are directly linked with chainsaw lumber production are obviously carpentry, lumber trading and possibly wood curving which may utilize off-cuts from specific tree species for a variety of artifacts and household utensils.

Chainsaw operation and farming were the two main livelihood activities respondents pursue for survival among the ten livelihood options enumerated in the study area (Table 2). Some respondents engaged in more than one livelihood activity, usually farming and chainsaw milling or other off-farm employment. This accounts for the total percentage of the summary presented in Table 3 being over 100. Eighty-one percent of the respondents were engaged in chainsaw operations, indicating that many more of them were engaged in this activity than in any other livelihood activity (Table 3). However, 58% of the respondents were farmers. These supplemented farm income with that from chainsaw operations. It must be noted that the sample of respondents for this study was generally dominated by people involved in chainsaw operations. Generally, people in forest communities may engage in chainsaw milling as secondary source of income with a few depending on it as their primary source of income (Asamoah *et al.*, 2007). It was discovered during the survey that some outsiders come in as migratory chainsaw workers to purposely undertake operations. Such people are obviously not interested in any agricultural work.

Table 2: Distribution of livelihood activities respondents engage in for income across districts surveyed

Livelihood activity/sources of income	Number of respondents engaged in the different livelihood activities for income in study forest districts							Total
	Assin Fosu	Begoro	Sunyani	Goaso	Kade	Oda	Juaso	
Chainsaw operation	6	16	10	12	8	9	9	70
Farming	3	8	10	11	6	9	6	53
Sawmilling operation	0	0	1	3	0	4	0	8
Livestock rearing	1	1	1	0	3	1	0	7
Paid work	1	1	0	1	2	1	1	7
Lumber carrier/porter	1	1	4	0	0	0	1	7
Carpentry	0	3	0	1	0	2	1	7
Petty trading	0	1	0	1	1	1	1	5
Collection and sale of products from wild	0	0	0	0	1	2	0	3
Taxi driver	0	0	1	0	1	1	0	3
Total	12	31	27	29	22	30	18	169

Source: Survey data, 2008

Table 3: Livelihood activities respondents engaged in for income

Livelihood activities/source of income	Number of responses	% of total responses
Chainsaw operation	70	81.4
Farming	53	57.7
Sawmilling operation	8	8.2
Livestock rearing	7	7.2
Petty trading	7	7.2
Paid work	7	7.2
Lumber carrier/porter	7	7.2
Carpentry	6	6.2
Collection and sale of products from wild	4	4.1
Taxi driver	3	3.1
Total	184	189.7

Source: Survey data, 2008

Note: Respondents are engaged in more than one livelihood activity so total percentages exceed 100.

While chainsaw operation has emerged as a major supplementary livelihood option in the rural economy, it must be acknowledged that the quick returns it provides makes it an attractive venture that will draw more people into the practice than any other livelihood activity in the rural economies under study. Amanor (2006) indicated that chainsaw lumber production has been a practice of old in forest areas in southern Ghana. Formerly, when the practice was legal, it employed well organized groups of the youth in these areas until it was criminalized in the 1990's. The practise has reliably supplied timber to the domestic market since the 1970's, when legal timber firms failed to satisfy domestic demand for lumber due to the recession or decline in the Ghanaian economy in those years. This means that the practice has been in existence for well over 3 decades. Criminalizing it has only led to the development of networks of gangs that promote

the practice to sustain livelihoods not only in rural areas but also in urban centres.

Chainsaw Dependent Enterprises

Chainsaw milling can enhance the rural economy through the provision of raw materials for certain enterprises. It offers increased livelihood opportunities for the rural poor and increased wood availability, particularly in agricultural areas (Pasiecznik, 2006). The upsurge in chainsaw operations in rural communities in the forest zone of Ghana has led to the emergence and increased business opportunities for wood-based enterprises in these communities in recent times. The major business that has emerged is carpentry, reported by 63% of the respondents. Trade in lumber has also increased (Table 4).

Table 4: Emerging businesses in the forest districts studied

Emerging business	Forest districts and number of respondents (n=59)									Percent of total respondents
	Assin Fosu	Begoro	Sunyani	Goaso	Kade	Oda	Juaso	Nkawie	Total	
Carpentry shops/business	4	9	3	2	4	9	2	4	37	63
Increase lumber trade	1	1	0	4	4	3	2	1	16	27
Backyard gardening	1	0	2	0	1	0	0	0	4	7
Stone quarry	0	0	0	2	0	0	0	0	2	3
Total	5	10	3	7	8	12	3	4	59	100

Source: Survey data, 2008

Comparative Advantage of Chainsaw Milling over other Livelihood Options in the Rural Economy

Generally, it is acknowledged that chainsaw milling might be more profitable relative to other key alternative income generating activities in the rural economy, which is usually farming. Comparing chainsaw milling to alternative livelihood activities, it was observed that the CI/AI ratios (CI=Chainsaw Income and AI=Alternative Income) were consistently higher at different time periods for monetary/income benefits derived from chainsaw lumbering for livelihood across the study districts particularly for chainsaw operators (Table 5). However, in some cases particularly for lumber carriers and farmers they might be better off doing the alternative work, instead of engaging in chainsaw

lumber production as indicated by the negative difference between chainsaw and alternative livelihood incomes and smaller CI/AI ratios. However, Odoo (2005) reported that although income earned by carriers and farmers from chainsaw operations might be meagre, it is comparatively more than working as farm labourers. The difference between chainsaw and alternative livelihood incomes (CI-AI) is the income forgone if the chainsaw actor chooses not to engage in chainsaw milling. This is quite substantial particularly for chainsaw operators at Oda where illegally produced chainsaw lumber may be targeted at the high priced markets in Accra and Tema. This also confirms the fact that chainsaw milling is lucrative and will be more attractive to rural youth than agriculture (Figure 6).

Table 5: Chainsaw lumbering benefits compared with alternative rural economic activities

District	Year	N	Type of Benefit	Chainsaw Income (CI) (GH¢)	Alternative income (AI) (GH¢)	CI-AI (GH¢)	CI/AI ratio
Goaso	2005-2008	17	Money for Livelihood	87,850	68,124	19,726	12.89
	“		Lumber/Wood	803	2,030	-1,227	3.95
	“		Farmland	701	2,000	-1,299	3.51
Oda	2006-2008	18	Money for Livelihood	149,628	24,990	124,638	59.87
Kade	2007-2008	7	Money for Livelihood	44,908	23,630	21,278	19.00
Nkawie	2007-2008	9	Money for Livelihood	6,000	3,991	2,009	1.50
Sunyani	2007-2008	14	Money for Livelihood	13,040	2,812	10,228	46.40
Assin-Fosu	2008	7	Money for Livelihood	10,080	6,750	3,330	14.93
	“		Lumber/Wood	500	200	300	25.0
	“		Farmland/Land	1.0	500	-499	0.02
Begoro	2006-2008	17	Money for Livelihood	16,770	12,980	3,790	12.90
	“		Farmland	110	200	-90	0.55

Source: Survey data, 2008

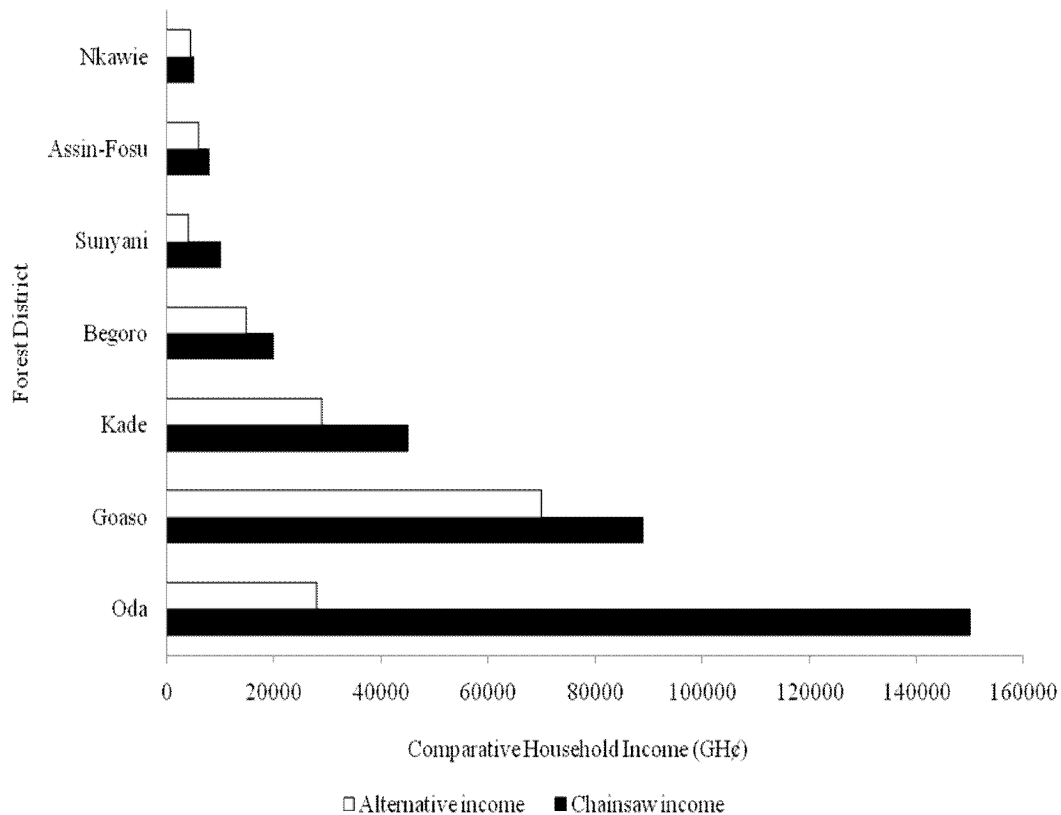


Figure 6: Income from chainsaw compared with income from alternative livelihood activities

Contribution of Chainsaw Milling to Rural Household Income

The important role chainsaw operations play in supporting rural livelihoods is further portrayed by its contribution to the household income of those involved in this enterprise. The annual gross income earned by a sample of 98 respondents from the variety of livelihood activities they under-

take ranged from GH¢25 to GH¢35,000 with a mean earnings of GH¢2,000 per annum. The percentage share of earnings from chainsaw operations to total household income among chainsaw operators varied greatly (Figure 7). However, 57% of chainsaw operators earned 50-98% of their household income from chainsaw operations.

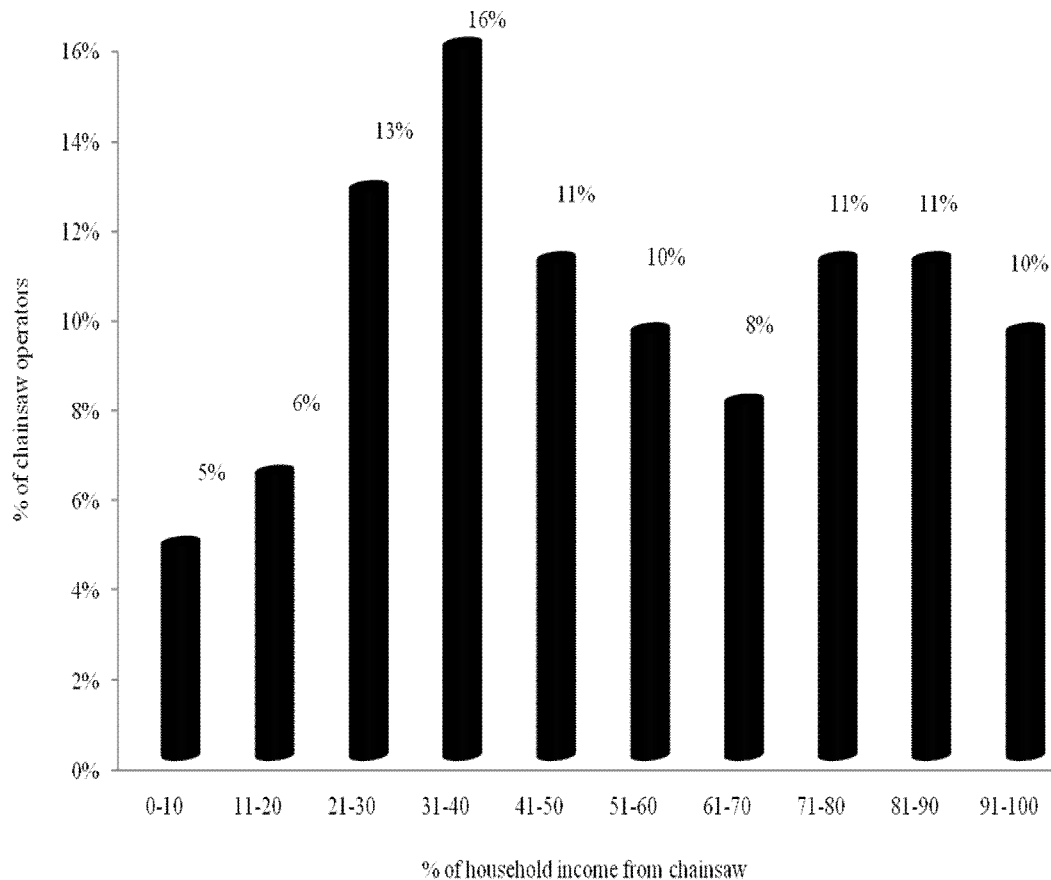


Figure 7: Chainsaw milling as a percentage share of household income in the 8 forests

CONCLUSION AND RECOMMENDATIONS

The findings above outline some positive contribution illegal chainsaw milling makes to rural economies of Ghana. The import of these findings is the seemingly livelihood support role the practice plays in the rural economy. In

sustainable livelihood parlance, illegal chainsaw milling can be said to contribute to financial and physical capitals of the areas studied, through the provision of employment and some basic amenities to the people. Illegal chainsaw activities contributed 50-98% to household budgets of over 50% of chainsaw operators. The practice is more lucrative compared to alternative income ventures

in the rural economy as indicated by the higher CI/AI ratios. There are indications of chainsaw operators conniving with resource owners. Farmers/landowners on whose land timber trees occur are paid for trees logged on their farms, compensation for crop damages and commission on trees logged. The critical issue here is the direct flow of money from tree resources to resource owners that protect or nurture them for timber. These findings suggest that measures for addressing the problem of illegal chainsaw milling in the country must focus on livelihood and environmental sustainability as well as effective harnessing of forest revenues for national development. Consequently, the following suggestions are being made for policy consideration to minimize illegal chainsaw milling in Ghana:

- i. Consideration need to be given to interventions that will contribute to the sustenance of rural livelihoods and prevent a further decline in the rural economy since agriculture, the major rural economic activity, is less lucrative.
- ii. Tree plantations have generally been shown to be profitable. Widespread promotion of community and private tree plantations in rural areas as an alternative lucrative enterprise needs urgent consideration. In a similar approach to the government President Special Initiative (PSI) on oil palm, a PSI for forest plantation development with an elaborate incentive mechanism will harness the skill and energies of the youth involved in illegal chainsaw operations for the production and processing of trees for the market. Fast growing species with short to medium term rotations will provide the needed short term income in rural communities. Also fast growing short rotation species could be planted for fuelwood and

charcoal production which are good alternative income ventures for the youth of the rural economy.

- iii. There is need for interventions that will reduce the economic competitiveness of chainsaw lumber on the market. This may include providing special incentives to reduce the production cost of lumber from regular sawmills to enable them supply the domestic market. There is need for discipline and strict compliance to the appropriate regulations on the part of the regular mills to supply the local market. The TIDD/FORIG (2009) Domestic timber study indicated that as much as consumers patronize chainsaw lumber for its availability and affordability, there are concerns for its durability.
- iv. The potential contribution of chainsaw lumbering to rural economic development especially through provision of employment and income as well as infrastructure must not be overlooked. This must be considered in the light of regularizing the practice which would require effective models for reorganizing chainsaw operations with intensive monitoring and enforcement of regulations that will ensure sustainable forest resource base as well as effective harnessing of forest revenues for equitable distribution for community and national development
- v. Connivance of chainsaw operators with local communities may be minimised by devising measures that will ensure that the primary owners of timber trees harvested from off-reserve areas gain directly from proceeds from their lands. Some competitive percentage of the revenue must be paid directly at

stumpage to the farmer or landowner. This will be an incentive for them to cooperate in the protection of timber trees. This also means that standard percentage of royalties that must be paid to these stakeholders needs to be derived for various species and diameter classes. The average amount paid per tree by chainsaw operators in this study is GH¢12.0. This could be as low as GH¢5 in some cases. The average official stumpage value for extraction of trees from farmlands is GH¢45 per tree, which is nearly four times that paid by the chainsaw operator. This option will be more attractive if the amount earned directly from official royalty by the farmer/landowner is relatively higher than that from chainsaw operators.

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