

Determinants Level of Income of Gums and Resins in the Dry Forest Areas and the Contribution to Different Socio Economic in Northwestern and Southern Ethiopia

Busha Teshome¹ Habtemariam Kassa² Christine Padoch³ Zerihun Mohammed⁴

1. Institute of International Forestry and Forest Products, Technische Universität Dresden, Piennner Str. 7, Box 01737, Dresden, Germany

2. Center for International Forestry Research (CIFOR), Ethiopia Office P.O. Box 5689 Addis Ababa, Ethiopia.

3. Center for International Forestry Research (CIFOR), P.O.Box. 0113BOCBD, Bogor 1600, Indonesia

4. Forum For Social Studies Addis Ababa Ethiopia

Abstract

Dry forests are dominant vegetation types in Ethiopia and are home to important gums and resins producing species. However, the factors affecting level of income and contributions of this resource to different socio economics are not systematically documented. Data was collected using key informant interviews, focus group discussions and formal survey. Data for the explanatory variables were collected from 300 randomly selected households. The findings indicate that the three study sites varied in terms access of households to gums and resins forests. The regression analysis factors affecting level of income revealed that distance to resource (-), TLU (-) for Yabello while land holding (+) in Asgedetsimbla, but there was no significant variable for the Quara site. Income from gums and resins collection was more important for the poor households. Planning dry forest product to household income should include different variables that affect the production of gums and resins.

Keywords: households, vegetation, dry forest, access, income, gums and resins

1. Introduction

Rural people living in or near forests, depend on forests products for food, fodder, medicines, and wood for energy and construction be it for own consumption or for sale of earning income (Nguyen and Sato, 2008). Africa's dry forests play especially significant roles in local livelihoods due to their high ecological, environmental and economic importance, yet they have received far less scientific attention than have moist forests, (Muys et al., 2006). In Ethiopia, dry forests are the most important forest type in terms of contribution to rural livelihood (Lemenih and Kassa, 2011). These forests host various species of *Acacia*, *Boswellia* and *Commiphora* that are sources of economically important gums and resins (Tadesse et al., 2007). Oleo-gum resins notably frankincense and myrrh, obtained from *Boswellia* and *Commiphora* species, respectively, have long had high economic and cultural value. They are important natural plant products used in several industries including pharmacology, food, flavor, liqueur and beverage, cosmetics, perfumery and others (Farah, 1994). Non timber forest products (NTFPs) have received increasing focus in the recent decades as a means of poverty alleviation and improving rural livelihoods (Ingram and Bongers, 2009). Studies indicated that NTFPs contribution to household income range between 10% and 60% of the income (Sultan, 2009; Neima, 2008; Shaanker et al., 2004; Cavendish, 2000). The gums and resins contribution to the improvement of livelihoods of local communities through food security and income generation and foreign exchange earnings has been extensively demonstrated in Ethiopia (Tadesse et al., 2007, Adefris, 2011, Abebaw et al, 2012,). Despite the importance of forests for the livelihood of dryland communities there has been a significant increase in forest loss over much of Sub-Saharan Africa during recent years. Dry forests in sub-Saharan Africa face high rates of deforestation and degradation, mainly from agricultural expansion (Lemenih, 2008). Thus dryland vegetation resources of Eastern Africa in general and that of Ethiopia in particular are facing serious problem of degradation (Mengistu et al., 2005). They are prone to desertification and global climate change. Forest losses hamper livelihoods of communities in drylands. In addition the consequent shortage of fodder and water are severely constraining the sustainability of pastoral land use systems (Lemenih and Kassa, 2008). Thus reducing deforestation and degradation and managing dry forests results increasing economic incentives to communities. One opportunity is the strengthening and marketing of gums and resins but are limited regarding accessibility of households to gums and resins collection and marketing and factors affecting the level of income they generate. This research was conducted to generate information in this regard it examined. The objective of the study was to examine rules and regulations governing access to forest resource to tap/collect gums and resins, to estimate the contribution of gums and resins to income of households belongs to different socio-economic wealth categories and to investigate factors determining households' the level of income they earn from gums and resins collection and marketing in the study sites.

2. Methodology

2.1. The Study Area

The study was conducted in three regional states of Ethiopia. One representative district was selected in each region. The selected districts are Asgede-Tsimbla district in Tigray Region, Quara district in Amhara Region and Yabelo district in Oromia Region.

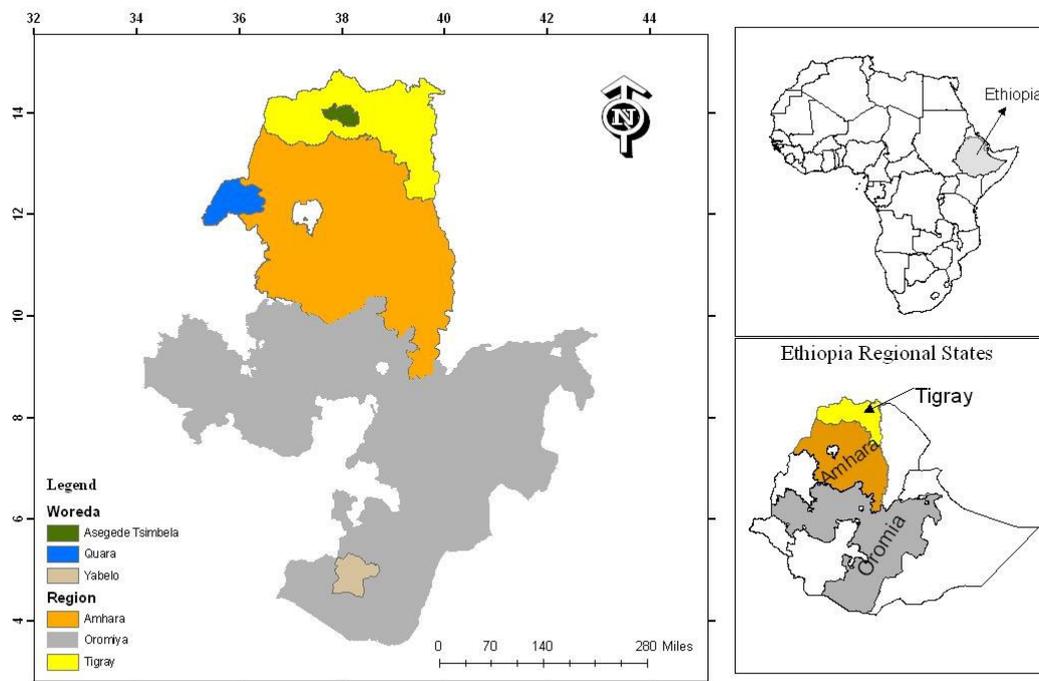


Figure 1. Location of the study areas in Ethiopia

2.2. Methods of Data Collection and Analysis

Prior to the formal survey, field visits were conducted to the three regions. Discussions were held with some community members, local authorities and experts working within the concerned government offices as well as staff of NGOs. Secondary data were collected from published and unpublished reports of relevant organizations at national and regional levels. A sample of households was selected and interviewed. The analyses were conducted on 300 households that completed all surveys (106 respondents from both Asgedetsimbela and Yabello and 88 for Quara study site). The questionnaire included questions on household characteristics, socioeconomic conditions, general farm information (including agricultural land holding, forest product collection and animal husbandry), livelihoods and their respective contribution to household income, and off-farm income for the production year 2009/10. Structured questionnaires were administered by enumerators under the supervision of researchers after being pretested and translated into the native languages. The survey was carried out between January and March, 2011. Both descriptive and inferential statistics were used to analyze the quantitative data. Descriptive statistics (Mean, standard deviation) and inferential statistics were used to study relationships between variables of interest by using t-test, χ^2 -test and regression analyses. The dependent variables studied using regression analyses were the determinants of income level from gums and resins of household. Wealth status definition of each district was used to designate the socio economic category of a given household. Accordingly, based on the indicators, three wealth categories (rich, medium and poor) were identified. In Yabello livestock holdings (>50, 20-50, and <20) in Asgedetsimbela mainly for land size (>1ha, 0.5-1ha, <0.5ha) and in Quara district land size (>2.5ha, 1-2.5ha, <1ha) were used to disaggregate households.

2.3. Household Income - Definitions and Estimation

The definition of income used in this paper is based on that outlined in the PEN technical guidelines (PEN, 2007), and is defined as the return to the labor and capital that a household owns, used in own production and income-generating activities (self-employment or business) or sold in a market. Transfers in the form of remittances, pensions, or other government payments are also included in the income definition. Total household

income is the sum of cash income and subsistence income (subsistence income is defined as the value of products consumed directly by the household or given away to friends and relatives). Production costs were deducted from the income generated in all cases excluding family labor. These costs were calculated and deducted from the total household income to estimate net household income. Accordingly, net income from crop was calculated as the difference between the total income from all crop production activities and the input costs incurred for crop production (the sum of wages paid to hired labor, costs of inorganic fertilizers, manure, improved seeds, and pesticides, rent paid on land leased in). Livestock income only includes income from the sale or consumption of livestock assets. Changes in stock values are not counted as income. Forest income was calculated by estimating the total volume of forest products collected by a household and multiplied by the market price per unit volume. Other forest products considered were firewood, wood for construction and farm implements, and medicinal plants. Income from gum and resins include all ABC species products. Incomes from off- and non-farm activities include income from occasional labor employment, wage employment, petty trade. Income from aid and remittance include support from government, non government organizations and gifts from to family members and relatives. All income results presented are net income, which is the gross income value minus all purchased inputs including hired labor.

3. Results and Discussion

3.1. Socio-Economic Characteristics of Respondents

From the total household interviewed, of whom 32(10.7%) are female headed household while the remaining 268(89.3%) are male headed household. The majority (94%) is in their productive working age group (15-65) and the remaining 6% are above 65 years old. The ages ranged between 21 and 75 years. The average family size of the respondents was 5.9 with minimum of one and maximum of 15. In terms of educational status, 65.3% of respondent are illiterate while the remaining 34.7% base some level of education. The farmland size owned by the sample households ranges between 0 and 10 ha with mean of 1.6ha. The minimum and maximum livestock holding in TLU was 0 and 121TLU with mean of 14.95TLU.

3.2. Accessibility of the households in gums and resins collection and income

The demand of the society for different NTFPs is immense, but resources are very much limited. In resource management both formal and informal rules, laws, and regulations play roles in the control over access to and use of the natural resources. Access to forest resources helps rural households to diversify their livelihood base and reduce their exposure to risk (Raintree, 2001). In Ethiopia, people living around the dry forest resource, where gums and resins is produced, have traditionally practiced tapping, collecting, processing and using different products. As a result forest proclamations, guiding rules and regulations, and directives of gums and resins production are being developed in the respective producing regions. The Tigray Regional State developed forest proclamation and the gums and resins development and marketing regulation. The directives of gums and resins production (Articles 3.2) denote the gums and resins bearing species on farmlands belong to the owner of the land. In addition it also allows tapping or rent to producers if the tree reaches the minimum diameter and height (Article 3.3). The regional government also began to form cooperatives or companies to engage in the production.

Rules and regulations have been in place for cooperatives or companies to make sure that they abide with certain management practices to ensure sustainable use of the resources. This is implemented mainly through allocation a block of forest to each producer. Each producer is assigned to forest blocks of size between 300 ha to 2500 ha. In each specified area, there are four to five blocks to allow for production and resting period. Only about two blocks being tapped for the production of frankincense for a given production year and then need to have at least two years resting period while the production is shifted to the other blocks. At the same time, the producers are required to engaged in restoration activities such as soil and water conservation, enrichment plantation (be it seedlings or vegetative propagation from cuttings) and protecting the forest from other anthropogenic activities. The producers are given the mandate to responsibly and sustainably utilize their forest blocks with a sense of ownership as per the set of rules and regulations.

In Amhara regional state, Quara frankincense production is entirely conducted from natural stands of *Boswellia*. The gums and resins development and marketing cooperatives directive of Amhara Regional States that individuals of the local community need to be organized in cooperatives to have the access right to utilize the resources. The production of gums and resins allowed for cooperatives and companies in concession area not for individuals. The directives Article 8.1 (a) allows the establishment of only one cooperative in one district. There seems to be a contradiction between the Regulation of the Bureau of Agriculture of Amhara Regional state (Regulation, 2007) and directive of the Bureau of Cooperatives (Directive, 2004) on the use of ABC trees on farmlands. The Bureau of Agriculture allows the use of the ABC species for production on farmland for individual smallholders without restriction, while Bureau of cooperatives made membership to a cooperative a precondition to produce gums and resins on farmland. The Amahra regional state encouraged the establishment

of the cooperative to regulate access right to the resource and then the first cooperative was established in 2008. These producers are given licenses to exploit an area for only one year. However, in contrast to Tigray region, the cooperatives and companies in the area did not practice any conservation activity seems that they only organized to get access rights.

According to the information from key informants in Yabello, the Borana communities have long experiences in protecting natural resources and the people have strong respect for the forest and species. In focus group discussions participants confirmed that the culture of respecting natural vegetation still exists to some extent but there is no special protection for tree species producing gums and resins. Formal access rights issued by the state for companies in the form of concession rights in northern part of the country were not observed in southern lowland of Yabello. As a result, there is no ownership or use restriction for any specific tree species including gums and resins producing ones.

The federal forest proclamation of Article 6(4) states that forest products shall be used for trade and industry development based on forest management plans. However, there is no forest management and close monitoring of producers in the Amhara region. Well-managed systems of access to resources are essential for both the national safety-nets and environmental sustainability (Scherr, 2000). However, in Oromia regional state, neither formal regulations and directives nor informal rules, are developed for gums and resins collection and marketing. In Yabello natural resources are traditionally communally used. There is no rule and regulation that put restriction on accessing and collecting of gums and resins. Such types of utilization pave the way for unsustainable use practices of the resources, especially when resources have good market potential (Heltberg, 2001).

3.3. Determinants of Income Levels from Gums and Resins

The amount of income a household earns from gums and resins collection is affected by different factors. In Yabello, distance to resource and livestock holding negatively affecting income levels from gums and resins. This is in agreement with the (Asfaw, 2008, Babulo et al, 2008, Mamo et al, 2007, Yemiru et al, 2010). Contrary to other findings Adilo(2007) concluded that livestock holding positively affected household decision to collect and use forest coffee (Sultan, 2009) finding that livestock holding was positively correlated with income from NTFP.

In Asgedetsimbla district Tigray region the size of landholding positively and significantly($P < 0.05$) affected income from gum and resin. As land area is a wealth indicator, these households are required to be member of gums and resins producing cooperatives and which in turn results in getting higher dividend. This is in line with the findings of (Sultan, 2009) in Ethiopia and with Mulenga et al., (2011) in Zambia who found out that landholding size was positively and significantly associated with higher share level of income from NTFPs. In contrast Babulo et al (2008) reported those households who have larger landholding were less likely to participate in forest products collection. For Quara district there was no specific variables affect level of household income from gums and resins.

Table 1. Regression result of factors affecting level of annual income of gums and resins

Factor	B	Std. Error	Beta	t	Sig.
Yabello					
(Constant)	1351.54	272.045		4.97	0
SEXHH	-15.321	146.442	-0.01	-0.11	0.917
AGEHH	-1.528	4.143	-0.04	-0.37	0.713
EDULEHH	-41.639	134.004	-0.03	-0.31	0.757
ACTVLAB	19.319	50.629	0.045	0.38	0.704
TLU	-5.742	2.66	-0.23	-2.16	.033**
LADHOLD	39.404	44.834	0.098	0.88	0.382
DOCREDIT	-139.97	121.941	-0.12	-1.15	0.254
DISRECOL	-7.168	4.145	-0.19	-1.73	.087*
DISMARK	2.662	1.936	0.145	1.38	0.172
Asgedetsimbla					
(Constant)	694.189	465.492		1.49	0.139
SEXHH	-89.818	300.875	-0.03	-0.3	0.766
AGEHH	2.313	8.643	0.035	0.27	0.79
EDULEHH	181.771	180.887	0.115	1.01	0.317
ACTVLAB	-51.407	61.939	-0.11	-0.83	0.409
TLU	0.878	8.404	0.011	0.11	0.917
LADHOLD	153.304	83.783	0.206	1.83	.070*
DOCREDIT	74.859	173.693	0.047	0.43	0.667
DISRECOL	3.718	8.546	0.044	0.44	0.665
DISMARK	1.669	1.728	0.098	0.97	0.336
Quara					
(Constant)	899.243	336.964		2.67	0.009
SEXHH	140.677	209.499	0.075	0.71	0.504
AGEHH	4.472	6.028	0.098	0.74	0.46
EDULEHH	-115.26	129.578	-0.1	-0.89	0.376
ACTVLAB	13.286	47.161	0.039	0.28	0.779
TLU	1.278	4.516	0.033	0.28	0.778
LADHOLD	31.194	40.523	0.089	0.77	0.444
DOCREDIT	173.355	126.515	0.159	1.37	0.175
DISRECOL	-0.669	5.858	-0.01	-0.11	0.909
DISMAKT	-8.093	8.936	-0.11	-0.91	0.368

3.4. The Contribution of Gums and Resins Income Disaggregated District Wealth Category

In Yabello the actual and percentage annual income from gums and resins of the rich, medium and poor wealth category amounts about ETB 930(4.68%), 1100.69 (9.88%) and 1215.42 (21.99%) respectively. The one-way ANOVA shows that statistically there is no significant difference between the absolute annual income from gums and resins across wealth class ($F(2,103) = 335082.849, P > 0.05$). Around Asgedetsimbla, the average annual income from gums and resins for the different wealth groups was found to be 1027.05 ETB (7.32%) for the rich, 1379.75 ETB (12.89%) for the medium and 954.82ETB (11.97) for the poor wealth group. Similar to the Yabello study site there is no statistically significant difference between the absolute annual income from gums and resins across wealth class ($F(2,103) = 1696539.629, P > 0.05$). The annual income contribution of gums and resins for the rich wealth group was about 1006ETB while it was 1262.22ETB and 1273.84ETB for the medium and poor respectively in Quara study site. The relative percent contribution was found to be 5.13%, 7.95% and 12.40% for the rich, the medium and poor wealth groups respectively. In Quara study sites also there is no statistically significant difference between the absolute annual income from gums and resins across wealth class ($F(2, 85) = 14890.647, P > 0.05$). Even though, variations of income of HH in different wealth classes were not statistically different, the HH in the poor category benefited more both at Yabello and Quara. This is in agreement with the results of Sultan (2009) and Berhanu (2004) who concluded that households in the poor category benefit more from NTFPs. The work of (Shackleton and Shackleton, 2004), also stated that poor household's, extracts greater income from NTFPs than the rich household.

3.5. Income Contribution of Gums and Resins by Gender of Household Head

When considering the income contribution of gums and resins to forest income in line with the gender of the household heads, it was found that in Yabello it contributes 12.77% of the total forest income for male-headed households, while 20.19% for female headed households. However, the absolute contribution to female and male

headed households was not significantly different. Even though collection of gums and resins requires physical strength, female headed households were engaged in the collection of gums and resins in Yabello, which was similar with the findings of (Adefris, 2011). In Asgedstimbla, gums and resins contribute 10.51% and 9.10% of the forest income for male and female headed households respectively. Around Quara, the contribution of gums and resins to female and male households forest income accounts for 8.83% and 10.12% respectively. Similar to Yabello, the difference in absolute income was not statistically significant for both sites. In Yabello, female households participate on collection of gum and resin, while in Quara and Asgedetsimbla women did not participate on collection but they benefit from by being members of cooperatives as they get dividends.

4. Conclusions and Implication

The contribution of dry forest income to rural households, which is largely overlooked in many economic policies and development strategies, is very important to the livelihood portfolio. There is reliance on the surrounding woodland for the production of gums and resins to supplement their livelihood. The collection of gums and resins is an important source of income, particularly to poor households in Yabello and Quara sites. However the absolute income contribution to wealth classes was not significant difference for all study sites. The contribution of gums and resins to gender of household head was not significant difference for all study sites while the work needed physical strength. Female headed households are comparably dependent on gums and resins income to male headed households to all study sites. The level of household income from gums and resins was affected negatively by livestock number (TLU) and distance to the resource at Yabello site whereas land owned was positively and significantly affected it at Asgedetsimbla. There was no variable used in this study affect income level in Quara. Gums and resins collection contribute to sample households income of the study areas. Hence it is recommended that planning dry forest product to household income should include factors that affect the level of income.

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