



Charcoal income as a means to a valuable end: Scope and limitations of income from rural charcoal production to alleviate acute multidimensional poverty in Mabalane district, southern Mozambique

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ABSTRACT

The charcoal industry is among the most important semiformal economic sectors in Sub-Saharan Africa and a key cash income source for local households who produce it. This has intensified the debate as to the role of income from charcoal production in the alleviation of rural poverty. While in a number of cases charcoal production has been identified as a potential alleviator of monetary poverty, this paper takes as its departure point a lack of analysis on the effect of charcoal income on acute multidimensional poverty (AMP). This is understood as the inability of household members to meet minimum national and international standards and core *functionings*. This study used primary data from an important charcoal supplying region in southern Mozambique (N = 312). The Alkire-Foster method was used to aggregate AMP in nine composite indicators. Generalised linear models were used to assess the marginal effect of charcoal income on AMP, controlling for other determinants. Our findings show a high intensity (67.7%) and prevalence of AMP (0.429) in the study area (n = 261). 59% of the identified non-monetary poor from charcoal making are identified as acute multidimensionally poor. Charcoal income is found to be positively correlated with valuable household assets, and charcoal production increases the resistance to impoverishment in certain circumstances. However, charcoal income was not found to be a statistically significant determinant of AMP, even for the most productive charcoal makers. This highlights the enormous barriers both producers and non-producers of charcoal alike face in this region in order to overcome AMP. Our findings thus challenge the perception that charcoal income can sufficiently alleviate poverty, particularly when a multidimensional perspective is adopted. Reductions and eventual eliminations of AMP require a concentrated cross-sectional whole-of-government approach to tackle poverty in its multidimensional breadth and complexity, while attempts at making the charcoal industry more inclusive and equitable should be accelerated.

1. Introduction

Charcoal is one of the most important domestic fuels used in Sub-Saharan Africa (SSA) (Butz, 2013; Girard, 2002). Charcoal is a popular woodfuel, particularly with urban consumers because of its clean and even burn (Jones, Ryan, & Fisher, 2016), and because it is affordable (Iiyama et al., 2015). Due to population growth and urbanisation it is projected that demand for charcoal will increase substantially until 2030 (World Bank, 2011). In consequence, the charcoal sector offers employment to millions of people and thus fulfils an increasingly important role for the economic

development of many countries in SSA (IAE, 2014; Ndegwa, Anhuf, Nehren, Ghilardi, & Liyama, 2016). In Mozambique for instance, it is estimated that up to 3 million people (approx. 15% of the population) are involved in the semi-legalised (yet mostly informal) charcoal trade (Cuvilas, Jirjis, & Lucas, 2010), with an estimated value equivalent of 2.2% of Mozambique's GDP (Van der Plas et al., 2012). In Kenya, the charcoal industry was estimated as the fourth biggest economic sector (Njenga et al., 2013) whose estimated market value paralleled in size to that of the tea industry (Mutimba & Barasa, 2005), while in Malawi it paralleled the tobacco and sugar industries (Kambewa, Mataya, Sichinga, & Johnson, 2007).

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The economic importance of the charcoal sector in most countries in SSA accelerated research efforts to analyse the role locally produced charcoal has on rural poverty. Most people engaged in the woodfuel market are rurally based (Openshaw, 2010) in the role of small-scale “casual” producers or transporters (Zulu & Richardson, 2013; Baumert et al., 2016), where producers have a viable opportunity to supplement income from other livelihood activities (Jones et al., 2016; Levy & Kaufman, 2014). Studies then differ in their assessment of the role of charcoal in poverty alleviation.¹ Studies found charcoal producers to be economically better off (Ainembabazi, Shively, & Angelsen, 2014; Schure, Levang, & Wiersum, 2014), with welfare benefits from charcoal making that contribute to poverty reduction (Fisher, 2004; Schure et al., 2014; Yemiru, Roos, Campbell, & Bohlin, 2010). The welfare benefits were found in some cases to be enough to lift certain groups of producers above the poverty line (Ainembabazi et al., 2014; Shackleton, Shackleton, Buiten, & Bird, 2007) which meant charcoal can be identified as a potential pathway or route out of poverty. This intensified calls for improved formalisations of the charcoal industry (Jones et al., 2016; Schure, Ingram, Sakho-Jimbira, Levang, & Wiersum, 2013; Schure et al., 2014; Smith, Eigenbrod, Kafumbata, Hudson, & Schreckenber, 2015).

Although economically better-off, and moving closer to the poverty line, some studies though found that the average charcoal producer continues to live below the poverty line (Schure et al., 2014: S85). Consequently, some studies rather identified charcoal cash income as a coping strategy (Kalaba, Quinn, & Dougill, 2013; Kambewa et al., 2007) or a safety net (Arnold, Köhlin, & Persson, 2006; Bekele & Girmay, 2014; Djoudi, Vergles, Blackie, Koame, & Gautier, 2015; Zulu & Richardson, 2013), where, for instance, charcoal producing households increase their resistance to idiosyncratic shocks by accumulating household savings. While unable to lift people out of poverty, charcoal cash income was found to contribute to the prevention and mitigation of poverty (Khundi, Jagger, Shively, & Sserunkuuma, 2011). For some subgroups of producers however, particularly for the chronic poor (Hulme & Shepherd, 2003) and the severely poor (Ravallion, 1998), charcoal production was found to be a poverty trap (Angelsen & Wunder, 2003; Ndegwa et al., 2016). These subgroups are characterised by an over-reliance on charcoal as a livelihood strategy, and little opportunity to expand their production or diversify into alternative livelihood activities. Returns are used to meet basic subsistence needs.

The predominantly monetary focus deployed in the studies reflect the entrenchment of the discussion in welfare and environmental economics as well as livelihood analyses. Charcoal is one of the most important “environmental income” sources across developing countries (Angelsen et al., 2014) and the academic debate on the role/contribution of charcoal income to wealth accumulation (Ndegwa et al., 2016), livelihood diversification (Jones et al., 2016; Schure et al., 2014; Smith, Hudson, & Schreckenber, 2017; Zulu & Richardson, 2013), and the absolute *vis-à-vis* relative dependence of different income quintiles on environmental incomes (Angelsen et al., 2014; Kamanga, Vedeld, & Sjaastad, 2009; Levy & Kaufman, 2014; Ndegwa et al., 2016) is rich.

¹ The empirically most applied poverty conceptualisation in the reviewed literature is by Angelsen and Wunder (2003: 2), whereby poverty alleviation encompasses both reductions in poverty and poverty preventions. Poverty alleviations are thus achieved if the poor obtain welfare benefits (e.g. from charcoal making) that allows them to move closer to the poverty line (becoming better-off), and ideally move above the poverty line, or prevents them from moving into poverty, or deeper into poverty. Other definitions found in the literature are similarly encompassing (e.g. Sunderlin et al., 2005: 1386); yet Sunderlin et al. replaces poverty reduction with poverty elimination. While poverty reduction may encompass becoming better-off, without necessarily leaving poverty, eliminating poverty necessitates leaving poverty, even if it is only temporarily. In this paper, the understanding of poverty alleviation is closer to Sunderlin et al. in that we do not analyse the depth and severity of poverty, but rather focus on the question of whether charcoal contributes to the elimination and prevention of acute multidimensional poverty. Whether charcoal helps reducing poverty (e.g. becoming better-off by moving from severe poverty status closer to the poverty line) is subject of analysis of another paper.

Yet the focus on income poverty and the derived welfare benefits from charcoal making also masks an important question: what is the contribution of income from charcoal production to the alleviation of acute multidimensional poverty? That is understood as the inability of household members to meet minimum national and international standards and core *functionings* (or achievements, such as access to clean drinking water and sanitation, see Alkire & Santos, 2010a, 2010b, 2014). Charcoal is a woodfuel and thus a forest provisioning ecosystem service (MEA, 2005, Kalaba et al., 2013). A systematic review of the empirical links between provisioning ecosystem services and poverty found a lack of analysis of multidimensional poverty (Suich, Howe, & Mace, 2015).² While most charcoal studies do analyse possible spill-over effects of charcoal cash income onto key indicators of human development – e.g. Ndegwa et al. compare the education of household heads of non-producers versus producers of different charcoal production scales (2016: 172) and Schure analyses spending patterns of charcoal income on education and healthcare – the selection of indicators used is selective and usually in a dashboard (where indicators are analysed separately from each other (see Alkire et al., 2015)). To our knowledge no charcoal analysis has used aggregated household data to systematically account for what is known as the *breadth of poverty* (Alkire et al., 2015): the empirical observation of simultaneous (joint) deprivations in key dimensions of well-being such as education, health or standard of living that have low inter-correlation and cut across the human, social and economic capital of the poor (Alkire & Foster, 2007).

In light of this research gap, the objective of this paper is to investigate the impact of rural charcoal production on the alleviation of acute multidimensional poverty, understood as both the prevention and eventual elimination of poverty (Sunderlin et al., 2005). Studies that analyse multidimensional poverty and their determinants are deployed more frequently in development and social economics (Ataguba, Ichoku, & Fonta, 2013; Mahoozi, 2016; Reeves, Rodrigue, & Kneebone, 2016; Santos, Dabus, & Delbianco, 2016; Wang, Feng, Xia, & Alkire, 2016). Such studies offer methodologically viable analyses of the now widely held view that poverty is a multidimensional phenomenon (as acknowledged as target 1.2 of the Sustainable Development Goals (SDGs) by the United Nations). We argue that the academic debate about the role of charcoal income on poverty alleviation is incomplete unless the instrumental value of charcoal income is systematically assessed as a means to a valuable end. That is, what is the contribution of charcoal income to the achievement of what is known as *functionings* that people have identified and have reason to value (Alkire & Santos, 2014; Sen, 1992; Sen, 1999).

We consider Mozambique an illuminating case study to investigate the impact of local charcoal production on acute multidimensional poverty. Firstly, the country typifies the challenge of managing mopane woodlands, the dominant vegetation type in southern Africa (White, 1983), for the benefit of the rural poor. While the country still has an extensive woodland resource (70% of the land cover; 55 M ha), rates of deforestation (0.2–1.7%/yr (Marzoli, 2007)) and degradation are high (2–3%/yr (Ryan et al., 2011)). Studies suggest that the rural poor are disproportionately disadvantaged by the woodland loss (see Baumert et al., 2016a; Baumert et al., 2016b; Woollen et al., 2016). The National Forest Directorate under the Ministry of Land, Environment and Rural Development uses a forests programme (*Floresta em Pé* (Standing forests)) under its flagship development program (*Programa Nacional Integrado de Desenvolvimento Rural Sustentável (Estrela)*) that aims to achieve that the sustainable use of forest resources is contributing to the alleviation of rural poverty (CGMC, 2015; Connect4Climate, 2015). The

² Suich et al. reviewed 398 refereed studies published from the year 2000 onwards on the empirical links between ecosystem services and poverty, and found that poverty was assessed at most in two dimensions of poverty, either relating to income/assets or food security/nutrition. Many studies were found to focus “only on income, rather than taking a multidimensional approach to poverty” (2015: 137–138).

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