

## Extended Abstract

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Title

# Context matters: Oil palm production and women's dietary diversity in the tropical forest of Cameroon

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**Abstract**

**200 words max**

Oil palm is one of the most rapidly expanding food and cash crops in many tropical regions with significant environmental implications, but also economic gains. Previous analyses have established that this expansion is associated with changing gender roles and time allocation for women. Time allocation is an important determinant of maternal and child nutrition as well as wellbeing. However, few studies on the socio-economic implications of oil palm expansion have taken a gender focus. Here, we use a rich farm household data from a native oil palm production hotspot, Cameroon to examine the relationship between oil palm production and women dietary diversity. Using a couple of estimation and identification strategies with different sensitivity checks, we show that oil palm is associated with reductions in women dietary diversity measured both as minimum dietary diversity for women and the minimum adequacy diversity diet. These findings contrast with the literature that has established some positive dietary diversity implications of oil palm expansion in Southeast Asia. We explore heterogeneity in the various food groups consumed by women where we find consistent results that oil palm production is associated with the reduced consumption of mainly pulses, fruits and vegetables. We carefully discuss these findings and argue that context matters and may explain these differences. Particularly, we show that oil palm production is negatively associated with the cultivation of food crops which have been shown to be relevant for dietary diversity. That notwithstanding, we also confirm previous findings that highlight that oil palm production is income increasing. However, these gains are not associated with improved dietary quality and adequacy for women, possible owing to less autonomy and control over farm management and income. These insights are crucial and add to the debate on the implications

of oil palm expansion in tropical environments. Moreover, they can guide policy in designing more tailored gender-equitable interventions that address intra-household issues and improve rural development.

**Keywords**

oil palm production; women dietary diversity; food production; income; rural employment; Cameroon

**JEL Code**

**Introduction**

**100 – 250 words**

Oil palm is one of the most rapidly expanding food and cash crops in many tropical regions (Byerlee et al. 2017). This expansion which can be described as explosive has been associated with both adverse environmental and social factors (Obidzinski et al. 2012; Qaim et al. 2020). From an environmental viewpoint, oil palm has been shown to distort land-use systems and lead to significant deforestation and landscape alterations (Busch et al. 2015; Ordway et al. 2021). Socially, the amassment of large parcels of land in many tropical areas by oil palm investing companies has resulted to conflicts in many oil palm hotspots (Gerber 2011; Abram et al. 2017). Similarly, there has been various child labour and low school enrollment concerns (UNICEF 2016; Li 2018).

Besides these socio-environmental implications, it has also been highlighted that oil palm is economically sustaining with numerous gains (Qaim et al. 2020). These benefits could explain this explosive expansion in many smalholder communities. Oil palm has been shown to increase incomes, sustain livelihoods and lead to significant welfare improvements (Rist et al. 2010; Krishna et al. 2017; Kubitza et al. 2018; Ayompe et al. 2021a). These gains are valid both for the farmers, but also for their communities (Santika et al. 2019; Krishna and Kubitza 2021). Income gains have been shown to have secondary implications on food and nutrition security (Euler et al. 2017; Chrisendo et al. 2020). That is oil palm increases consumption expenditure and household dietary diversity (Euler et al. 2017; Sibhatu 2019). It is however not clear whether these income gains translate to other nutritional outcomes for individual household members such as women<sup>1</sup>. This is a valid, but not well studied question especially given that oil palm production has been associated with changing gender roles and time

<sup>1</sup> Since women are having less control and decision-making power over farm management and income, there may be loss in female autonomy which may affect their nutrition. Mehraban et al. 2022 speaks to this loss in autonomy owing from increase time allocation to non-profitable activities.



allocation implications for women (Elmhirst et al. 2017; Rowland et al. 2022; Mehraban et al. 2021).

**Methodology**

**100 – 250 words**

Given this, we examine the relationship between oil palm production and nutrition security for women. Specifically, we investigate whether oil palm production is associated with dietary diversity gains for women. We leverage a farm household survey from an emerging oil palm hotspot in Cameroon and employ the Minimum Dietary Diversity for Women (MDD-W) indicator as the proxy for women dietary diversity (FAO and FHI 360 2016). We also compute the Minimally adequate diet diversity (MADD) indicator that further speak to aspects of diet adequacy and quality. We estimate different regression models, including the Poisson regression model, linear probability model and the two stage least squares regression approach. We also estimate a Kinky least square regression model and Oster bounds as robustness checks on the main study findings. In contrast to the narrative that oil palm increases food security and dietary diversity, we find that oil palm is associated with reductions in women dietary diversity. We explore heterogeneity in these result by performing separate regressions for all the 10 food groups of the MDD-W indicator. We show that oil palm production is inversely associated with the intake of pulses and legumes, dark vegetables, vitamin A rich fruits and vegetables, other fruits, and other vegetables.

To understand what may be driving these contrasting results, we explore four pathway mechanisms (food crop production, cash crop production, income, and off-farm employment for women) and perform some heterogeneity analysis. We find that oil palm production is associated with displacements in food crop production as it associated with a reduced likelihood that households cultivate food crops. We also show that oil palm production is correlated with the cultivation of other local cash crops such as cocoa, plantains, groundnuts, egusi, and banana. Going further, we confirm that oil palm production is income increasing with gains even at the per capita basis. However, we do not find any support from the data that oil palm production is associated with off-farm employment for women. We discuss these findings in the context of the rich literature on the welfare implications of oil palm production. Important to mention here is the role of context as the sectors in Cameroon and Southeast Asia particularly Indonesia may be substantially different. An analysis of the sectors in Ghana and Indonesia speaks to these

contextual differences (Ruml et al. 2022). Of course, the policy context, institutional systems, associated land-use changes, milling conditions and access to markets may be structurally different and could largely explain these results.

## **Results**

**100 – 250 words**

Our analysis and findings offer a couple of contributions to the growing literature on the socio-economic and nutritional implications of oil palm expansion. In the first place, we offer new and contrasting insights on the nutritional implications of oil palm production by exploring its implications for women dietary diversity. A focus on women is important given that oil palm has been associated with changing gender roles for women in oil palm producing households (Chrisendo et al. 2020). Moreover, given that women are mostly responsible for household food security (Tibesigwa and Visser 2016), insights from this analysis are quite informative since poor maternal nutrition can lead to lower household food security through jeopardizing their ability to care for the food demands of their children and participation in income generating activities (Malapit and Quisumbing 2015). Oil palm production has been associated with time allocation and decision making implications for women which may have nutritional and health implications (Rowland et al. 2022; Mehraban et al. 2022). Our second contribution is in explaining what could be driving this adverse relationship between oil palm production and women dietary diversity. We show that oil palm production significantly displaces food production. This is an interesting finding given that production diversity has been shown to be important for food security and dietary diversity in many rural communities, although not universally applicable (Sibhatu and Qaim 2018). Third and related to the second, we provide empirical support to the literature that has underscored that oil palm production is income increasing with significant welfare gains (Rist et al. 2010; Kubitza et al. 2018; Ayompe et al. 2021a; Ayompe et al. 2021b). Although, we observe income gains, this does not translate to women dietary diversity likely due to less autonomy and as well as less control over farm management decisions and income control (Mehraban et al. 2022). Finally, we offer a different perspective to oil palm production in a unique environment. Cameroon, like many other oil palm producing countries in West and Central Africa are native zones of production. However, yields and production are low and lag far behind the sector in Southeast Asia (Jaza Folefack et

al. 2019). Here, we argue and show that context matters, and policy developments should take this into account when pushing for interventions and programs to stir the sector.

**Discussion and Conclusion**

**100 – 250 words**

Our findings offer a couple of implications for policy development. In the first place, we offer empirical support to the literature highlighting the income gains from oil palm production in a native but emerging hotspot of oil palm expansion. Given the limited policy and institutional support offered to oil palm farmers, it may be important for policy to consider various ways of supporting and promoting oil palm development. This support has the possibility of not only increasing welfare at the household level but also at the community level. Despite these advantages, income gains in the Cameroonian context are not able to translate to improved nutrition for women. Oil palm production reduces women dietary diversity. In this regard, the second entry point for policy could be to ensure gender-equitable rural development in oil palm producing regions. Given that the underlying mechanisms behind this negative relationship are displacement in food production, possibly due to time allocation. Oil palm production in Cameroon has a long value chain that involves most members of the household, although the gains go to the household heads in most cases. Reducing the time allocation to oil palm cultivation could greatly increase cultivation of food crops which are necessary for consumption and dietary diversity. One way to reduce this time allocation may be to get farmers involved in various institutional coordination mechanisms like cooperatives and contract farming which could improve input provision but also processing which is very time consuming given that it is done rudimentarily.

One other leverage point to reduce labour cost and manpower may be to improve milling conditions. This also has the potential of fully maximizing and increasing income gains as well as reducing inefficiencies along the value chains. This is one crucial area where the oil palm sector in West and Central Africa can learn from the Indonesian case. Most oil palm farmers in Indonesia are contracted to large milling companies that buy fresh fruit bunches from farmers and process them. In Cameroon on the other hand, processing is done by farmers using artisanal mills. These mills have been highlighted to lead to significant deforestation in Cameroon



(Ordway et al. 2021). Thus, improving access to industrial mills may have far reaching welfare implications with the potential to reduce some of the environmental effects of oil palm expansion. On another front, providing support to existing oil palm farms to boost intensification instead of extensification may also reduce the trade-off between socio-economic gains and ecological safeguards