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Troubled agronomy: Exploring challenges affecting oil palm production among indigenous rural farmers in Karonga district, Malawi

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Agriculture remains fundamental in addressing socio-economic challenges in developing countries including Malawi. Through agriculture, oil palm (*Elaeis guineensis*) production has been essential as source of food, creation of job opportunities, income generation, hence offering potential pathways for reducing rural poverty. In Malawi, oil palm production is an old tradition practiced by the Nyakyusa people, residing in Karonga District. Despite these indigenes being involved in oil palm production, the growth of this agricultural activity has been stagnant. Using sequential explanatory design with triangulated data collected by means of questionnaire, in-depth interviews and focus group discussions, researchers explored challenges confronting oil palm production among indigenous rural farmers in Karonga District. Measures of frequency, crosstabulation and correlation were used to analyse quantitative data. Interpretive phenomenological analysis was used to analyse qualitative data. Researchers used sample size of 477, and found that farmers, constituting 61.0% have limited market access; 52.4% limited farm equipment and machinery; 79.9% limited access to credit; and 67.1% limited information, posing significant barrier to the growth of this agricultural activity. Researchers recommended that the Malawi Ministry of Agriculture should collaborate with other stakeholders in the agriculture sector and establish local markets; provide access to technology and machinery, loans and finance through government interventions and private sector partnerships; and provide extension services to address information gap.

Key words: Oil palm, oil palm production, indigenous rural farmers, poverty, agriculture.

INTRODUCTION

Globally, agriculture increases the socio-economic status of people all over the world, especially, the world's poor population who are dependent on it as their main source of livelihood (Kalu et al., 2023). In developing countries, agriculture plays key role in ensuring food security among

populations, serve as source of foreign exchange, create employment opportunities, and reduce expenditure on importation, hence forming foundation for economic development (Todaro and Smith, 2009; Udemezue and Osegbue, 2018). Also, according to the Food and

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Agricultural Organisation report (2021), agriculture accounts for 4% of global gross domestic product (GDP) and in some least developing countries, it can account for more than 25% of GDP.

Through agriculture, the production of oil palm, offer potential pathways out of poverty among rural people (McCarthy et al., 2012). Oil palm is a multifaceted crop and one of its characteristics is its high yield in terms of the amount of oil produced per unit of cultivated area, with two different types of products that can be extracted from the fruits, namely, palm crude oil and palm kernel oil from the seeds of the fruit (Chiriaco et al., 2022). Again, oil palm is a precious crop as products derived from oil palm fruits are widely utilised both at the domestic and industrial level as source of edible food and cosmetics. Oil palm and its associated products, is extensively traded in terms of vegetable oil globally, accounting for approximately 60% of total trade and constituting a substantial 25% of the world's total vegetable oil consumption (World Bank, 2010).

Numerous scholarly investigations have documented the positive outcomes of oil palm production on the lives of rural farmers. These benefits include increased income, employment opportunities, enhanced livelihoods, and significant contributions to overall economic growth. For example, McCarthy (2010), and Edwards (2019), found that oil palm production has diversified occupations and livelihoods, supplemented household income through labour opportunities, and provided nutrition for vulnerable populations via edible oil.

In terms of profitability, Feintrenie et al. (2010) revealed that oil palm is a highly profitable source of income globally in all ecologically suitable areas. Also, Sunarminto et al. (2019) demonstrated that the development of oil palm plantations in Indonesia has stimulated economic growth and created new income sources for rural households. Similarly, Alwarrtzi et al. (2016) noted that oil palm plays a significant role in stimulating the economy and improving the well-being of local populations, contributing to poverty alleviation and food security. In response to limited employment prospects and widespread poverty in Indonesia, the expansion of oil palm led by small-scale farmers has been incorporated into the national economic development agenda.

In West African countries such as Ghana and Nigeria, scholarly works have shown that oil palm generates employment opportunities and alleviates poverty in rural regions. For instance, Khatun et al. (2020), highlighted that oil palm serves as a consistent revenue stream, is adaptable to drought conditions, and provides cooking oil for domestic use. The crop, predominantly grown by rural farmers, plays a vital role in regional economies and the sustenance of rural communities. For example, in Ghana, oil palm yields two types of oil: oil from fresh fruit bunches (FFB) and palm kernel oil (PKO). Oil from FFB has diverse applications in culinary goods, cosmetics, and

detergents, while palm kernel oil is commonly used in cooking regional stews and customary soups.

Nigeria in particular, oil palm plays an essential role in sustaining the livelihoods of many rural farmers. According to Adesiji et al. (2016), oil palm is a widely cultivated cash crop among farmers in the rural regions of Kogi State. Furthermore, oil palm production, predominantly managed by rural farmers, helps alleviate the socio-economic challenges they face in maintaining their livelihoods. In addition to generating revenue, palm oil extraction provides substantial employment opportunities, thus contributing to the economic stability of rural communities. The crop also ensures a steady source of food and essential household products, enhancing the overall quality of life for rural inhabitants. By offering diverse benefits, oil palm cultivation supports both economic development and social well-being in these regions, underscoring its importance as a multifaceted resource in Nigeria's rural landscape.

Despite the recognised advantages of oil palm production for rural farmers, some scholars have identified significant challenges that impede the growth of this agricultural activity and its associated socio-economic benefits. For instance, Nurfatriani et al. (2019) highlighted the critical issue of insufficient capital investment among rural farmers engaged in oil palm production. This lack of financial resources is a prominent barrier, preventing farmers from making necessary investments in their agricultural activities. These financial constraints severely limit the ability of rural farmers to invest in essential inputs such as quality seeds, fertilizers, and modern farming equipment. This financial shortfall also affects their ability to implement sustainable farming techniques, and enhancing productivity and profitability. Additionally, rural farmers involved in oil palm production often face significant barriers to accessing crucial information about best farming practices. This lack of information is a critical impediment, as access to up-to-date and effective agricultural knowledge is essential for maximising the benefits of oil palm production (Rodthong et al., 2020).

Oil palm production in Malawi is a long-standing tradition among the Nyakyusa people, who reside in the Karonga District. Oil palm production is not just an economic activity; it is also a cultural tradition that has been handed down through generations. The communities take pride in preserving and continuing this practice, which is an integral part of their identity. Again, the production of oil palm is characterised by distinct gender roles. Men primarily engage in the physical labour of plucking oil palm fruit bunches while women are involved processing to extract the valuable oil. However, despite its historical significance and the extensive experience of the local farmers, the growth of this agricultural activity has remained stagnant. This stagnation raises concerns about the underlying factors impeding the progress of this agricultural activity. To

address these concerns, researchers embarked on a study to explore the challenges that indigenous rural farmers in Karonga District face in oil palm production. This research aimed to uncover the barriers hindering the growth and expansion of this traditional agricultural practice, with the goal of providing insights and potential solutions to enhance the productivity and economic benefits for the local farming communities.

METHODOLOGY

Research design

The research adhered to a structured methodology outlined by Creswell and Clark (2018), which guided the systematic process of data collection, analysis, interpretation, and reporting. Upon identifying the research problem and establishing the methodological approach, a sequential explanatory research design was chosen. This decision stemmed from the recognition that an initial analysis of quantitative data would provide a comprehensive understanding of the research issue, laying a solid foundation for further exploration. By beginning with quantitative data analysis, a broad perspective was aimed for, acknowledging that this quantitative framework would offer valuable context and breadth to the investigation.

After the quantitative phase, the focus shifted to the collection and analysis of qualitative data. This phase aimed to refine and complement the quantitative findings. Specifically, detailed explanations and insights were sought, particularly regarding participants' viewpoints and experiences (Ansah, 2020; Subedi, 2016). Through qualitative inquiry, a deeper exploration of the intricacies of the research problem was pursued, capturing the richness and complexity that quantitative measures alone may not fully elucidate.

Study area, population, sample size and sampling procedure

The research was conducted in Karonga District, Malawi, specifically within Traditional Authority (T/A) Mwakaboko in the Northern region. T/A Mwakaboko, situated on the northern side of Karonga district, shares borders with Tanzania, which influences trade and community interactions. Politically, it falls under Karonga North constituency, responsible for local governance and national representation. T/A Mwakaboko was chosen due to its historical association with oil palm production, a tradition spanning generations.

Within Traditional Authority (T/A) Mwakaboko, four communities were selected: Mwakaboko, Nyasa, Kasewe, and Mwangulukulu. These communities were chosen based on their accessibility, convenience, and the availability of respondents. They were preferred over others with difficult access due to flooded rivers. The study targeted household heads, with 171 households in Mwakaboko, 189 in Nyasa, 167 in Kasewe, and 153 in Mwangulukulu.

To address the research inquiries concerning challenges confronting oil palm production among indigenous rural farmers in Karonga district, a simple random technique was employed for respondent selection. The lottery method within the simple random technique was used to select households engaged in oil palm production as respondents for the study. The researchers applied Slovin's formula (Tejada and Punzalan, 2012) to determine the sample size, calculated as $n = N / (1 + Ne^2)$, where n is the sample size, N is the population size, and e is the acceptable margin of error. The sample size was determined based on the

study's objectives, research questions, and philosophical stance (Edwards and Holland, 2013). The total population for the study was 680 households, and with an accepted error margin of .05, the derived sample size was 477 using Slovin's formula. Consequently, 477 questionnaires were administered across all four selected communities involved in oil palm production.

To fulfill the qualitative requirements of the study, purposive sampling was employed to select participants, focusing on opinion leaders from chosen communities. Eight in-depth interviews were conducted with eight key informants, comprising five men and three women. Additionally, convenient sampling was used to select discussants, resulting in four focus group discussions involving 39 discussants, including both men and women engaged in oil palm production from selected communities. Each focus group consisted of approximately equal numbers of men and women, with one group having slightly fewer women.

Data collection, analysis and presentation

During data collection, for the quantitative aspect, the questionnaire, guided by Vogt, Gardner, Haeffele, and Vogt (2014), was administered to households involved in oil palm production. Four research assistants, trained by the researchers, administered the questionnaire to indigenous rural farmers. Also, to address qualitative needs, in-depth interviews, guided by an interview guide, were conducted. Again, focus group discussions, guided by a discussion guide, were also held with indigenous rural farmers engaged in oil palm production to enrich data on its significance and challenges. Questionnaires were translated in local language (*Chichewa*). Interviews and focus group discussions were conducted in local language as well.

Research instruments were pre-tested. Pre-testing research instruments ensured cultural relevance and sensitivity to indigenous rural farmers' context, reducing misinterpretation risks. It assessed linguistic appropriateness, clarity, and understandability for effective communication. It also identified potential participation barriers and gauged respondents', participants' and discussants' understanding levels, leading to instrument refinement through question deletion, rewording, and rearrangement to improve logical flow.

After gathering data through questionnaires, responses were compiled into a dataset, checked for missing or inconsistent entries, and verified for accuracy. The dataset was then coded and categorised for analysis. Descriptive statistical analysis was employed to summarize and depict relationships between variables within the sample, ensuring organised presentation and coherence, as indicated by Kaur, Stoltzfus, and Yellapu (2018). Frequency measures were used to enumerate instances and proportions, aiding in accessible comprehension of the dataset's counts. Hypotheses were tested using correlation analysis, processed with IBM SPSS version 27. Interviews and focus group discussions underwent transcription, sorting, and organisation in accordance with research methodology standards (Babbie, 2012). The interpretative phenomenological analysis (IPA) methodology was adopted, facilitating a deep dive into individuals' experiences, consistent with the perspectives of Eatough and Smith (2017).

Tables were constructed to present quantitative data, aiding in elucidating patterns, trends, and statistical relationships (Larson-Hall and Plonsky, 2015). These tables improved the accessibility and comprehensibility of findings, providing a structured framework for delineating interconnections and predictive relationships among variables (Hudson, 2015). Thematic presentation played a pivotal role in qualitative data analysis, offering a systematic approach to identifying, organising, and interpreting emergent themes (Sunder et al., 2019). This method facilitated a nuanced exploration of meaning across the dataset, linking empirical findings to broader theoretical frameworks.

Table 1. Age group of respondents.

Age range	Frequency	%
21-30	95	19.9
31-40	133	27.9
41-50	84	17.6
51-60	71	14.9
61-70	42	8.8
71-80	45	9.4
81-90	7	1.5
Total	477	100.0

Source: Field Data (2023).

Table 2. Gender dimension of oil palm farmers.

Variable	Frequency	%
Male	310	65.0
Female	167	35.0
Total	477	100.0

Source: Field Data (2023).

Ethical approval

Approval for the study protocol was obtained from the Malawi University of Science and Technology Ethical Review Committee (MUSTREC) referenced P.05/2023/051. All ethical principles adhered to standard guidelines in alignment with the MUSTREC.

Informed consent

Participating households provided explicit consent for their involvement in the surveys. The document, presented in a comprehensible manner, clarified in both local and accessible language, communicated the voluntary nature of participation. Furthermore, participants were assured that any information gathered would be strictly utilised for academic research purposes and treated with utmost confidentiality.

RESULTS AND DISCUSSION

Age

The age range of indigenous rural farmers involved in oil palm production was computed as one of the crucial demographic characteristic often examined in research across various fields. From Table 1, age categories of indigenous rural farmers involved in oil palm production, revealed that majority of farmers were in their productive age. Taking into account the age range of 21 to 60, which constitute 80.3%, fall within the productive age in as far as labour force in agriculture is concerned. This productive age group suggests stable and potentially productive workforce. This finding finds its support from

Saiyut et al. (2019), who revealed that the productive age group in agriculture ranges between 20 and 60, as this age group is typically associated with higher levels of physical strength, energy, and work capacity, which are essential for agricultural activities like oil palm production.

Gender

The analysis of gender of respondents was conducted in order to get valuable insights into indigenous rural farmers' life circumstances, social dynamics, and potential implications for this study. Again, the analysis of gender within the surveyed population in the dataset was not only for understanding the distribution of male and female respondents but also for uncovering valuable insights the role of gender in social, cultural and economic dynamics of farmers involved in oil palm production (Doss, 2014).

From Table 2, a total of 65% of farmers involved in oil palm production were males, while 35% were females. The male dominance in this agricultural activity suggests patriarchal and land acquisition system among farmers. This finding may reflect existing social and cultural norms practiced by these rural farmers. Furthermore, in the course of interviews, Nyauzedi, one of the female key informants reported that *land belongs to the husband's side. This is the case when a woman gets married; she has to move to the husband's side. In the event that the husband dies, the husband's side may repossess the land leaving the woman with no place to cultivate.* This was further corroborated by Dambuyo, one of male key

Table 3. Origin of oil palm production.

Reason	Frequency	%
Learnt from neighbours	178	37.3
Inherited from family	168	35.2
Knowledge of oil palm trees	112	23.5
Business mindset	17	3.6
Attendance of Agricultural trainings and workshops	2	0.4

Source: Field Data (2023).

informants who said that, *land inheritance favours boys as compared to girls. When a young man marries, parents take a portion of land and give it to him to cultivate such that the proceeds from farming can help him to take care of his family. When a young woman marries, she has to move to her husband's side.* It can therefore be deduced that among rural farmers, patriarchal system leads men to have upper hand in land acquisition. Consequently, this kind of system is of disadvantage to women. For example, in terms of accruing benefits from oil palm, men will be advantaged compared to women (Kilic et al., 2015).

It can be concluded that the skewed gender ratio between men and women among rural farmers may have implications for resource allocation and decision-making within households. In contexts where men dominate agricultural production, they may exert greater control over land, inputs, and income generated from oil palm production. This imbalance in decision-making power can perpetuate gender inequalities and hinder women's ability to influence household-level decisions related to farming practices, resource management, and investment priorities.

Development of oil palm production

Oil palm production among indigenous rural farmers in Karonga district is an old tradition associated with the Nyakyusha people residing in the northern side of the district. This agricultural practice predominantly adheres to a singular trajectory. These farmers operate independently, operating outside of contractual agreements and without organisational affiliations such as cooperatives. Through the questionnaire, respondents were asked to indicate how they started oil palm production.

From Table 3, data revealed that indigenous rural farmers' neighbours and family members were reference point upon which they started practicing oil palm production. A cumulative 72.5% of respondents revealed to have engaged in oil palm production by learning from neighbours and inheriting from their families. Also, 23.5% indicated knowledge of oil palm trees, denoting experiential knowledge through daily interaction with

trees. Furthermore, 3.6% revealed to have business mindset, exhibiting entrepreneurial mindset, yet insignificant. With a minimal 0.4% of respondents indicating to have learnt oil palm production through attendance of agricultural trainings and workshops, depicts how the government including NGOs' are lowly involved in this agricultural activity, leading to traditional method being engrained in this agricultural endeavour.

In tracing the development of oil palm production among indigenous rural farmers, Chindiwo, one of the discussants from Kasewe village, said that *aaah, hmm... History of oil palm production dates far. Our forefathers learnt about oil palm production in Tanzania. Our forefathers after seeing people in Mbeya and Kyera on how they were producing cooking oil and making soap from oil palm, they learnt the idea, and brought it here, taking advantage of the available oil palm trees in our area.* Furthermore, Khumucho, one of the discussants from Mwakaboko village, reported that *oil palm production was learnt from Tanzania by our grandparents. This community is close to Tanzania, and people in this area are involved in trade exchange with people from Tanzania, and this led to learning of some of ideas about oil palm by our parents.*

From the accounts of the discussants above, it can be argued that apart from learning oil palm production from neighbouring country, Tanzania, the proximity of this valuable crop played pivotal role among indigenous rural farmers. As noted by Tyson et al. (2018), the knowledge and proximity of oil palm to local communities are some of the factors for effectively harnessing its potential. Furthermore, the transference of knowledge within families highlight the importance of indigenous knowledge and informal sources of information in agricultural activities. That is, the significance of indigenous knowledge and informal sources of information is underscored by its roots in family and friends among rural farmers.

Land cultivation capacity

Land among rural farmers remains a property cherished as it is inherited from family members. Most of the land in Malawi is customary based and rural farmers hold small

Table 4. Land size cultivated.

Number of acres	Frequency	%	Mean
1 – 2	413	86.5	1.85
3 – 4	38	8.0	
5 – 6	16	3.4	
7 – 8	10	2.1	
Total	477	100.0	

Source: Field Data (2023).

Table 5. Education level of farmers.

Education Level	Frequency	%
Never attended	63	13.2
Primary level	333	69.9
Secondary level	77	16.1
Vocational and tertiary level	4	.8
Total	477	100.0

Source: Field Data (2023).

pieces of land. Through the questionnaire, the researcher requested respondents to estimate the acres of land they cultivate.

From Table 4, data revealed that most of rural farmers involved in oil palm production cultivate land between one and two acres. A cumulative 86.5% of rural farmers revealed to have utmost two acres of land. Furthermore, the statistics portrayed in Table 2, suggests that on the average, each household cultivate land equating to 1.85 acres.

Inquiring further why there is minimal cultivation of land for oil palm, Gogo, one of the discussants from Mwakaboko village said that *there is enough land in this area where farmers can cultivate more oil palm. However, due to market problems, farmers cultivate small pieces of land.* This account clearly illustrates the prevailing and ailing factors necessitating to low cultivation of acres of land among rural farmers. The dimension upon which farmers operate, thus, market challenges as pointed out; contribute to less cultivation of pieces of land. As argued by Jayne, Mather and Mghenyi (2010), in Sub-Saharan Africa, rural farmers are engaged low acres of land cultivating for crops as strategies, due to some challenges including market and loss of labour.

It can therefore be concluded that the cultivation of one to two acres of land suggests that oil palm production is primarily characterised by small-scale farming operations. Also, the small land size cultivated for oil palm reflects constraints in resource endowment among rural farmers, including limited access to markets. Arguably, limited resource availability may restrict the scale and intensity of farming activities, leading to lower productivity and income levels.

Education level

The researchers, through the use of the questionnaire, delved into asking respondents to indicate their level of education as education plays significant role in shaping development strategies and interventions among rural farmers.

From Table 5, a substantial significant figure of 69.9% of respondents revealed to have attained basic primary school. The high% of respondents who have attained basic primary school education suggests a relatively high level of access to formal education. This indicates that efforts to promote primary education access and enrolment have been relatively successful (Kadzamira and Rose, 2003), potentially contributing to increased literacy rates and foundational knowledge among farmers. Arguably, in Malawi, attaining primary school education serves as a primordial stage upon which farmers can learn from others, including attending to workshops and seminars tailored towards improving their farming practices (Phiri et al., 2019). In relation to oil palm production, the majority of indigenous rural farmers attaining basic primary school, suggests that farmers may have fair knowledge and willing to adapt to new changes.

Nevertheless, interaction patterns among indigenous rural farmers and access to information regarding oil palm production may be influenced by level of education. That is, education level influences the ability to seek and gain information in relation to oil palm production. As such, cross tabulation was conducted to check the level of education and information sources regarding oil palm production.

From Table 6, data has revealed that a total of 98.6%

Table 6. Crosstabulation on education level and source of information.

Education level	Family and friends (%)	Workshops/Seminars (%)	NGO's (%)	Other sources (%)	Total (%)
Never Attended	61 (12.8)	1 (0.2)	1 (0.2)	0 (0.0)	63 (13.2)
Primary Level	330 (69.3)	1 (0.2)	1 (0.2)	1 (0.2)	333 (69.9)
Secondary Level	75 (15.7)	0 (0.0)	0 (0.0)	2 (0.4)	77 (16.1)
Vocational/ Tertiary	4 (0.8)	0 (0.0)	0 (0.0)	0 (0.0)	4 (0.8)
Count	470 (98.6)	2 (0.4)	2 (0.4)	3 (0.6)	477 (100)

Source: Field Data (2023).

Table 7. Income levels.

Weekly income	Frequency	%
MK5,000 - MK10,000	387	81.1
MK11,000 - MK20,000	90	18.9
Total	477	100.0

Source: Field data (2023).

rely on family and friends as source of information regarding this agricultural activity, irrespective of education level. With the majority of indigenous rural farmers relying on family and friends as source of information, depicts the pivotal role of informal sources in addressing the knowledge gap. Also, the reliance on family and friends as information sources highlight the importance of community networks and social influence in disseminating knowledge about oil palm production. It suggests that informal networks among indigenous rural farmers play a crucial role in sharing information and influencing decision-making processes.

Again, the centrality of family and friends as primary sources of information, highlight the communal and traditional aspects inherent in the dissemination of knowledge among indigenous rural farmers.

This observation suggests that family and friends occupy pivotal role in the preservation of knowledge regarding oil palm production, underscoring the indispensable contributions to the continuity and progression of expertise essential for this agricultural activity. With the family and friends being core in information and knowledge sharing, depicts indigenous knowledge and informal sources taking role in this agricultural activity.

The danger of relying on family and friends as sources of information and knowledge is when the custodians of knowledge are no longer there, the continuity and perpetuity of the practice losses its value.

Income

Through the questionnaire respondents were asked to indicate the income level generated through oil palm

production at the household level. This was driven upon noting that farmers are involved in cooking oil production commonly known as *mawese* in their communities.

Based on Table 7, it was observed that majority of indigenous rural farmers, 81.1% of the surveyed population, affirmed that their weekly earnings met or not exceeded the threshold of 10,000 Malawi Kwacha. This amount equates to approximately 10 United States Dollars (US\$10). This revelation underscores a dominant economic reality within the surveyed demographic, signifying a prevalent income level that holds implications for a spectrum of socio-economic facets.

Inquiring further what farmers are engaged in to generate income, Chinoko, one of the discussants from Mwakaboko village, narrated that *from oil palm fruits, we produce cooking oil. What happens is that we boil oil palm fresh fruits, then we sieve water to produce oil. At times we add sodium bicarbonate to produced oil so that we can make soap which we use in our houses.* Furthermore, Mbamba, one of the discussants from Kasewe village said that *when we sell cooking oil, we get money that help in buying basic needs for our families. Even though markets are difficult, as we trade with people from Tanzania, still we get money that sustain our families.*

The income significance of oil palm production among rural farmers underscored profound importance of oil palm within the fabric of rural economies. That is, oil palm production among rural farmers is key in contributing to income gains (Qaim et al., 2020).

This multifaceted impact, in turn, positions oil palm as a pivotal agent in the pursuit of sustainable development and the amelioration of poverty in rural landscapes.

Furthermore, Chinoko's account of locally boiling oil palm fresh fruits to produce cooking oil, underscores the

Table 8. Acres of land cultivated and benefits of oil palm production.

Variable	Benefits of oil palm production	
	Pearson Correlation	-0.195**
Number of Acres	Sig. (2-tailed)	0.000
	N	477

Source: Field Data (2023).

relevance of indigenous knowledge in supporting the lives of these rural farmers. As revealed by Goduka (2012), indigenous knowledge has served as an enduring and indispensable component in the preservation and sustaining livelihood among local communities. Furthermore, locally boiling of oil palm fruits also underscored the dynamic and adaptable nature of indigenous knowledge, which exhibits a remarkable capacity to evolve and innovate in response to changing circumstances and requirements.

Correlation analysis of acres of land cultivated and benefits from oil palm production

The researchers hypothesised that there is an interplay between acres of land cultivated and benefits farmers accrue from oil palm production. The anticipation was that the more acres of land cultivated, the more likelihood that farmers will gain benefits such food, increase job opportunities, hence meeting basic needs. From Table 8, Pearson correlation coefficient value of -0.195 in the analysis of acres of land and benefits from oil palm production among indigenous rural farmers, was observed, indicating a moderate negative correlation. This suggests that as number of acres of land cultivated by farmers increase, there is a tendency for benefits from oil palm production to decrease. Also, the significance value (sig) of 0.000 was observed, revealing that this correlation is statistically significant. This observation contradicts the normal situation in as far as oil palm production is concerned. For instance, Alwarrizti et al. (2016), argued that the increase of land cultivated for oil palm has the effect that can be seen from the increase in farmers' incomes, hence increasing the purchasing power of the indigenous rural farmers, for both primary and secondary needs.

Nevertheless, while there is a statistically significant correlation between acres of land and benefits from oil palm production, the relatively weak strength of correlation suggests that other factors influence the realisation of benefits from this agricultural activity. In pursuit of such factors whilst in the course of focus group discussion, Gomba, one of the discussants from Mwangulukulu village, said that *there is enough land in this area where farmers can cultivate more oil palm. However, due to market problems and lack of equipment that can promote our farming, benefits from this activity*

are relatively low. Also, Nyauzedi, one of the female key informants, said that *one of the factors that derail our oil palm production is access to market. Markets are not within our reach as we sell our cooking oil in Tanzania.*

Arguably the testimonies from Gomba and Nyauzedi highlight two key challenges faced by indigenous rural farmers engaged in oil palm production, including lack of modern equipment and limited access to markets. The limited access to market cripples the realisation of benefits from this agricultural activity. The reference to selling cooking oil in Tanzania indicates a significant barrier to market access for these farmers, as they have to travel to another country to sell their produce. Again, the mention of using traditional methods for producing cooking oil and soap suggests a reliance on outdated techniques, which hinders efficiency and productivity in oil palm production.

CHALLENGES AFFECTING OIL PALM PRODUCTION

Through the questionnaire, respondents were asked to rate challenges they face regarding oil palm production within their agricultural landscape.

Limited access to market

From Table 9, a significant portion of 5.7% of respondents indicated lightly, 33.3% indicated moderately, while 61.0% disclosed highly encountering limitations to market access. Limited market access poses significant barrier to income generation among indigenous rural farmers. Commenting on limited access to markets, Namoyo, one of the female discussants from Mwakaboko village, complained that *there are no markets within our communities. We rely on markets in Kyera or Mbeya, Tanzania. Transportation is difficult from here to Tanzania. At times, traders from Tanzania come to buy oil from us, and the problem is that they set prices for us.* Furthermore, Nagama, one of the discussants from Mwangulukulu village, highlighted the heightened effects of limited market access by saying that *due to market problems, we rely on traders from Tanzania who come to buy oil. Traders determine the price, which makes us not realising much benefits from oil palm production. At times, because we don't have the capacity to break palm kernels, traders from Tanzania come with their machines,*

Table 9. Challenges confronting oil palm production.

Challenge	Lightly		Moderately		Highly	
	Total	%	Total	%	Total	%
As a farmer, I face poor market prices and networks	27	5.7	159	33.3	291	61.0
As a farmer, I face transportation challenges	27	5.7	169	35.4	281	58.9
As a farmer, I lack technology including machinery	38	8.0	189	39.6	250	52.4
There is lack of credit for me as a farmer	96	20.1	192	40.3	189	39.6
As a farmer, I lack adequate information	157	32.9	131	27.5	189	39.6
As a farmer, I do not have the requisite skills to oil palm	93	19.5	212	44.4	172	36.5
As a farmer, I do not have access to workshops	59	12.4	272	57.0	146	30.6

Source: Field Data (2023).

charge us to break the kernels, and in the end, they also buy the crushed palm kernel nuts.

From the narrations by Namoyo and Nagama, it emerged that the dearth of well-established market leaves indigenous rural farmers grappling with uncertainties regarding the selling of their produce. The absence of direct market access has left farmers dependent on middlemen or intermediaries to sell their oil palm products. This leads to loss of income for farmers, as middlemen often have greater bargaining power and control over market transactions.

Inquiring what can be done to address the challenge of limited market access, Kaguka, one of the male key informants, said that *we wish our government through the Ministry of Agriculture could help us by opening markets around our communities. Moreover, we have companies in the country that produce cooking oil. I think these companies should support us by buying palm oil.* Kaguka's account suggests that local companies that produce cooking oil should support farmers by purchasing their produce. Again, Kaguka indicates a desire for collaboration between the government, private sector, and indigenous rural farmers to improve market access and create opportunities for selling oil palm products locally. Arguably, limited market access to rural farmers expose them to volatile conditions such as low level of income generation, unfair pricing of commodities by middlemen or traders (Derembwe, 2015). This in turn, exacerbates poverty among indigenous rural farmers, and stifles the growth and expansion of oil palm production.

It can therefore be concluded that the reliance on distant markets and intermediaries has exposed indigenous rural farmers to exploitative practices and unfair pricing; hindering their ability to realise optimal benefits from oil palm production, hence contributing to stunted growth and expansion of this agricultural activity.

Limited farm equipment and machinery

The data extracted from Table 9 further underscored the

deficiency in the use of modern equipment and machinery, as indicated by the respondents. Among the surveyed population, 8.0% reported a light impact, 39.6% indicated a moderate impact, while a noteworthy majority of 52.4% disclosed being highly impacted by limited use of modern farm equipment and machinery. Furthermore, in the course of focus group discussions, testimonies from local farmers, elucidated adverse effects of this limitation. For instance, Maduku, one of the female discussants from Kasewe village, complained that *some of the challenges that we face as farmers are related to lack of equipment that can promote our farming. As you can see, oil palm trees are tall, and to harvest fruits become difficult. This makes our farming difficult, and hard to realise potential benefits. Moreover, the way we make cooking oil, it is traditionalistic, such that we do not produce more cooking oil.* Similarly, Chitunda, one of the male discussants from Mwakaboko village, reported that *as farmers who have been involved in oil palm production for long, we lack machines and other equipment that can help in our farming. As you can see, palm trees are tall and to extract fresh fruits becomes difficult for us.*

The testimony provided by Maduku, underscored the labour-intensive nature of harvesting oil palm fruits and processing cooking oil, compounded by the absence of equipment, impeding farming efforts and compromising the quality of the produced oil. Similarly, Chitunda lamented the absence of equipment to aid in oil palm production, emphasising the difficulty in extracting fresh fruits from oil palm trees. Arguably, these narratives illuminated the tangible obstacles and practical difficulties hindering productivity and profitability of oil palm production, ultimately impacting the livelihoods of these farmers.

The implications are profound, as the absence of equipment and machinery not only limits production efficiency but also restricts indigenous rural farmers' ability to capitalise on the economic viability of oil palm (Vermeulen and Goad, 2006). It can therefore be argued that the limited use of modern equipment and machinery has negatively contributed to low income generation among rural farmers, thereby impeding the growth of this

agricultural activity.

Limited access to credit

From Table 9, a portion of 20.1% indicated lightly, while 79.9% of the surveyed population face challenges of access to credit ranging from moderate to high. With this high, it is evident that this issue poses a substantial barrier to the growth oil palm production among indigenous rural farmers. Furthermore, in the course of focus group discussion, Gada, one of the discussants from Mwakaboko village, complained that *as farmers, we face challenges related to access to credit in terms of loans. If there can be intervention from the government or any other organisation that can help us with small loans, so that we can invest in oil palm production, and possibly we will be getting more benefits.* Furthermore, Chiguwo, one of the male key informants, complained that *lack of credit and loans for us farmers is bringing back the cultivation of oil palm among farmers.* Arguably, testimonies provided by Gada and Chiguwo, emphasised the adverse effects of limited access to credit. For instance, Chiguwo's statement underscored the direct impact, by indicating that limited access to credit inhibits their ability to invest and engage in oil palm production effectively.

The implication of this challenge is profound, as access to credit is essential for farmers to invest in inputs, equipment, and technology necessary for increased production.

With limited access to credit, rural farmers may struggle to expand their operations, adopt modern farming techniques, or cope with unexpected expenses, thereby hindering the growth and sustainability of oil palm production (Tambi et al., 2021). However, as a way of mitigating and promoting oil palm production among rural farmers in countries such as Indonesia and Malaysia, the provision of credit to rural farmers has facilitated the growth of this agricultural activity, as it has enabled rural farmers to access inputs such as improved seedlings, fertilisers, and pesticides, which are vital for the optimisation of oil palm including buying equipment for harvesting, processing, and oil extraction (Bronkhorst et al., 2017).

It can therefore be argued that limited access to credit among indigenous rural farmers has contributed to low expansion and growth of oil palm production, as farmers do not have capital to invest in this agricultural activity.

Limited access to information

Among indigenous rural farmers engaged in oil palm production in Karonga District, a significant challenge arises of limited access to information from relevant authorities such as the Malawi Ministry of Agriculture and

other stakeholders within the agriculture sector in Malawi. Data revealed that 67.1% of the surveyed population face varying degrees, ranging from moderate to high, with 32.9% lightly indicating the limited access to information. Furthermore, in the course of focus group discussions, Kilifi, one of the discussants from Mwangulukulu village, highlighted this profound deficiency by saying that *farmers involved in oil palm production, hardly have information or extension services from government or any other organisation. This impedes our farming practice.* Furthermore, stressing on lack of information, Dodolido, one of the discussants from Nyasa village, narrated that *to have good farming practices demands having extension services from agriculture experts. However, since we started farming, there is no single day an extension service worker came to teach us best farming practices to promote our farming.* Kilifi's statement underscored how the absence of vital information hinder farming practices, by indicating a critical gap in knowledge dissemination and agricultural extension services. Similarly, Dodolido's narrative emphasised the necessity of extension services for promoting effective farming practices, lamenting the apparent neglect in this regard. This limited access to information not only impedes the optimisation of oil palm production but also inhibits farmers' ability to adopt best practices and enhance productivity (Maclvor, 2019). Arguably, access to information does not only negatively affect indigenous rural farmers with best practice methods, but also market information. That is, with access to information, rural farmers can ably know market trends, prices, and this help them make informed decisions about when and where to sell their produce more strategically (Fan and Salas Garcia, 2018). Furthermore, access to information enable rural farmers to stay updated on modern and sustainable techniques, including efficient use of resources, environmentally friendly cultivation methods, better farming strategies, leading to increased productivity (Misaki et al., 2018). Also, rural farmers equipped with information are better prepared to tackle challenges such as climate change including extreme weather events, and climate-smart agricultural practices (Henriksson et al., 2021). It can therefore be argued that limited access to information impedes the optimisation and growth of oil palm production among indigenous rural farmers

Limited access to extension services

Provision of agricultural extension services is essential for the realisation of benefits from oil palm production. As revealed by Maertens, Michelson and Nourani (2021), agricultural extension services play an indispensable and multifaceted role in addressing the informational challenges faced by rural farmers. These services are a vital bridge, facilitating the dissemination of knowledge and encouraging the widespread adoption of advanced

agricultural technologies. By providing rural farmers with valuable information, training, and resources, agricultural extension services empower them to make informed decisions about the implementation of improved farming practices.

In Malawi, the focus of agricultural extension services include four overarching objectives, namely “the widespread dissemination of novel technologies and agronomic practices related to national staple food crops; the augmentation of farm incomes through the cultivation of high-value crops, particularly targeting small-scale, landless, and indigenous farmers; the empowerment of farmers by fostering social capital within the community; and, the enhancement of farmers’ capabilities to implement sustainable natural resource management practices (Ragasa and Niu, 2017, p.7). Inquiring whether there is progress in this agricultural practice in line with provision of extension services, Nyabango, one of the discussants from Nyasa village, said that *oil palm production in our communities has been stagnant. For example, we do not receive advisory services from the Ministry of Agriculture*. Furthermore, Nyabanda, one of the female key informants, corroborated by complaining that *farmers here use traditional, archaic knowledge, and old knowledge which was handed down from our forefathers. Furthermore, there is no single day when an agriculture advisor from Malawi Ministry of Agriculture came to teach farmers of best farming practices*. From Nyabango and Nyabanda’s accounts, the absence of advisory services from the Malawi Ministry of Agriculture indicates a gap in government support for oil palm production among indigenous rural farmers. Arguably, the absence of advisory services deprive indigenous rural farmers of valuable information and guidance needed to make informed decisions about this agricultural activity. Also, the absence of advisory services regarding oil palm production can lead to missed opportunities for economic development, poverty reduction, and rural transformation.

Again, the absence of agricultural advisors presents a missed opportunity for capacity building and knowledge transfer within the farming communities. Inquiring what the ministry is doing regarding provision of extension services to indigenous rural farmers involved in oil palm production, Godiya, one of agricultural development officers from Malawi Ministry of Agriculture, said that *indeed, as a ministry, we have not been able to provide extension services to farmers involved in oil palm production. This can be the case as the crop is just a minor crop in the country though it has potential benefits if we look at it in other countries which are advanced in oil palm*. The consideration of oil palm as a minor crop in Malawi was further corroborated by Gonthi, who is also one of the Crop Development Officer in the Malawi Ministry of agriculture, who said that *oil palm in the agriculture sector is considered as a minor crop. This can be attributed to the population which is involved in this agricultural activity. As you can see, it is only cultivated*

by communities in the northern side of Karonga district.

From Godiya’s account, it appeared that there is limited support for oil palm production from the MoA. The absence of extension services to oil palm producing farmers suggests a gap in agricultural support mechanisms, hindering farmers’ access to technical knowledge, resources, and best practices for oil palm production (Maclvor, 2019). Again, from Gonthi’s account of characterising oil palm as a minor crop implies that its significance and potential benefits are underestimated or undervalued within the agricultural sector. This perception is contributed by limited investment, research, and policy support for oil palm production compared to other cash crops such as tobacco and sugarcane, as revealed by Zulu (2017). This lack of support impedes the growth and expansion of oil palm production, thereby limiting its potential contribution to rural livelihoods and economic development.

Conclusion

From this study, it can be concluded that indigenous rural farmers engaged in oil palm production face significant challenges that impede the growth, expansion and farmers’ ability to maximise benefits from this agricultural activity. The Pearson correlation coefficient value of -0.195 indicated a moderate negative correlation between the number of acres cultivated and benefits derived, suggesting that as the cultivated area increases, the benefits tend to decrease, contradicting typical expectations. The significance of this correlation (p -value = 0.000) highlights underlying issues such as limited market access, modern equipment, credit facilities, and extension services, which collectively stifle productivity and profitability.

Again, farmers’ testimonies and the survey data underscored the critical impact of these challenges. Limited market access, as highlighted by farmers’ reliance on distant markets and middlemen, results in unfair pricing and reduced income. Additionally, the absence of modern farming equipment and machinery hinders efficient production, while restricted access to credit prevents necessary investments. The absence of extension services further exacerbates these issues by depriving farmers of essential knowledge and resources.

RECOMMENDATIONS

Researchers recommended that the Malawi Ministry of Agriculture should collaborate closely with other stakeholders in the agriculture sector to establish local markets, thereby reducing farmers’ dependence on distant markets and middlemen who impose unfair pricing. Additionally, the Ministry should work with private sector partners to provide access to modern equipment

and machinery, enhancing production efficiency and reducing labour intensity. Government interventions and partnerships with financial institutions are essential to facilitate access to loans and finance, enabling farmers to make necessary investments in their operations. Furthermore, the provision of extension services is crucial to address the current information gap, equipping farmers with the knowledge and skills needed to adopt best practices and innovative techniques for oil palm production. This multifaceted approach will help mitigate the challenges faced by indigenous rural farmers and promote sustainable growth in the oil palm production.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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