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DOES RICE COMMERCIALISATION EMPOWER WOMEN? EXPERIENCE FROM MNGETA DIVISION IN KILOMBERO DISTRICT, TANZANIA

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ACRONYMS

APRA	Agricultural Policy Research in Africa
DAICO	District Agriculture, Irrigation, and Cooperative Officer
DFID	Department for International Development
DSS	Department of Development Studies
FAC	Future Agricultures Consortium
FAO	Food and Agricultural Organisation
FGD	focus group discussion
FHH	female-headed household
HDI	Human Development Index
ICE	Institute of Continuing Education
IDS	Institute of Development Studies
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
IIRR	International Institute of Rural Reconstruction
KIT	Royal Tropical Institute
KPL	Kilombero Plantation Limited
MHH	male-headed household
MPI	multidimensional poverty index
MSF	medium-scale farmer
OPHI	Oxford Poverty & Human Development Initiative
RCI	rice commercialisation index
SAGCOT	Southern Agricultural Growth Corridor of Tanzania
SPSS	Statistical Package for Social Sciences

SRI	System of Rice Intensification
SSA	Sub-Saharan Africa
SSF	small-scale farmer
TASAF	Tanzania Social Action Fund
TAZARA	Tanzania Zambia Railway
UK	United Kingdom
UN	United Nations
UNDP-UNEP PEI	United Nations Development Programme-United Nations Environment Programme Poverty Environment Initiative
UNU-WIDER	United Nations University World Institute for Development Economics Research
URT	United Republic of Tanzania
WEAI	Women's Empowerment in Agriculture Index
WS	work stream

EXECUTIVE SUMMARY

Rice commercialisation in Mngeta Division is believed to be the fundamental driver for economic growth, poverty reduction, and improvement in the livelihoods of men and women living there. In recent years, rice commercialisation in the area seems to have received new impetus in terms of technological and marketing linkages. As households engage in agricultural commercialisation, it is anticipated that the division of labour or gender roles will change. Such changes may either lead to women being empowered or it may increase their workload. This paper explores whether and to what extent ongoing rice commercialisation initiatives contribute to women's empowerment and inclusion in social and economic development in the study area.

This paper uses data from the first round of research on the programme called Agricultural Policy Research in Africa (APRA) in Tanzania which under Work Stream 1 (WS1) focused on rice commercialisation in Mngeta Division in Kilombero District, Morogoro Region. The methodology is underpinned by the conceptual thinking on agricultural commercialisation whereby it is argued that agricultural commercialisation may occur due to external investment (by the government or private investors), market specialisation, farm consolidation, or a combination of these factors.

Considering the strong influence of rural electrification on rice processing, and hence commercialisation, stratified sampling was employed to place villages in three categories, according to their electricity status, namely: (i) with electricity by 2016/17, (ii) switching villages that would have electricity by 2017/18 and (iii) villages that would not have electricity connected by 2019. Farm households from which sampling was done were classified as small-scale farmers (SSFs), medium-scale farmers (MSFs), and system of rice intensification (SRI) farmers – those implementing different SRI management practices. Hence, the total sample for the study included 537 households from ten villages. The qualitative and quantitative data were simultaneously collected in all ten villages through face to face interviews using structured questionnaires. A total of 116 farmers participated in focus group discussions (FGDs) (36.2 per cent female, 63.8 per cent male) and 24 key informants (16.7 per cent female and 83.3 per cent male), including the farm manager of Kilombero Plantation Limited (KPL), the coordinator of farmers' groups from KPL, and the District Agriculture, Irrigation, and Cooperative Officer (DAICO) from Kilombero District.

Qualitative data were transcribed verbatim and organised into themes that represent key drivers of rice commercialisation and women's empowerment in the study area. The emerging themes were then organised and compared. Additionally, in-depth interviews and timelines reported during FGDs enabled researchers to establish the trend of rice commercialisation initiatives in the area since 1980 up to 2017. The analysis of quantitative data was done at two levels. First, the level of women's empowerment was computed by developing the composite women's empowerment index, and then the degree of rice commercialisation attained by different categories of farmers was computed using Excel, Stata, and SPSS software. The household bargaining model was used to analyse the impact of rice commercialisation on women's empowerment where women's bargaining power in decision-making and control over assets and income were key proxy indicators.

The majority of rice farmers in Mngeta Division own the land that they use for rice cultivation. The common means of land ownership is through purchase (31.2 per cent), renting (27.1 per cent), and being allocated by the village government (15.8 per cent). The percentage of land with legal status of ownership was very low (only 33 per cent), implying that most of the acquired land does not have authorised title deed identification.

Land acquisition and ownership status in Mngeta Division reflects a gender bias since 87.2 per cent of all legally acquired land is registered under a man's name, only 9.9 per cent had a woman's name, and very few (5.7 per cent) had joint ownership. A higher proportion of men than women were primarily involved in managing the plot (54.3 per cent compared to 45.7 per cent) and men also made most of the final decisions on how the plot should be used (53.9 per cent and 46.1 per cent for men and women respectively). As well as this, men

were responsible for making important decisions over the outputs accrued from rice plots (57.7 per cent for men compared to 42.3 per cent for women).

Men and women's participation in unpaid care activities also show a gendered pattern. Women disproportionally spent more time on care work than their male counterparts (4.6 hours and 7.3 hours for men and women respectively). Women's participation in unpaid care work at the household level contributes to their disempowerment as they have less time to participate in paid economic activities as their male counterparts do. The main sources of non-farm income for households in Mngeta Division include income from casual labour, regular employment, gifts, enterprise income, safety net income, and regular farm income. Overall, men received more income that accrued from these sources except for income that accrued from net gifts and net safety income.

A significantly higher proportion of the male-headed households (MHHs) were more food-secure compared to female-headed households (FHHs). About 72.2 per cent and 52.5 per cent of the MHHs and FHHs respectively reported being food-insecure. This trend is influenced by the fact that female-headed households face many constraints regarding access to land and labour required for production. Therefore, they tend to have smaller plots and lower total volumes of harvest. The distribution of food security status varied across villages such that respondents from villages with electricity were more likely to be categorised as having a food-secure status than those from the villages without electricity. This is probably due to the impact of rice commercialisation whereby many households have multiple sources of income alongside paddy production. Access to land and education of the head of the household were inversely related to food insecurity, implying that the acquisition of more land increased food security. About two thirds (69.6 per cent) of the women who were of reproductive age met the minimum dietary diversity requirements. Women belonging to the household categorised under medium-scale farmers (MSFs) were more likely to have more dietary diversity (75.4 per cent) than those from small-scale farmers (SSFs) (67.5 per cent) and SRI farmers (72.7 per cent). Respondents from villages with electricity had higher dietary diversity scores (72.2 per cent) than those from villages without electricity (67.2 per cent).

The analysis of women's empowerment revealed that 36 per cent and 34.6 per cent of the respondents were categorised in the low and medium levels of empowerment respectively, while about one third (29.4 per cent) were in the high level. Women's empowerment was found to increase with the age and education level of the household head and whether the household head was a woman. Empowerment also increased with household size, land size, and land ownership. The level of women's empowerment was highest (42.9 per cent) among respondents living as single and lowest (0 per cent) among those living under a cohabitation arrangement. There was a higher proportion of women categorised in the high level of empowerment in villages with electricity (39.4 per cent) than women in villages without electricity (23.1 per cent). The level of women's empowerment varied with the type of farmer categories, whereby SRI farmers had a higher proportion of women categorised in a higher level of empowerment than MSF and SSF farmers. The level of women's empowerment increased with a rise in women's income (farm and non-farm incomes). The level of women's empowerment was also highest among women who had higher incomes than their spouses and it was lowest among households where men and women reported about the same level of income.

The trend of distribution of women's empowerment by their level of participation in rice commercialisation indicated that women who were more empowered were more likely to be categorised in higher commercialisation quintiles measured by the rice commercialisation index (RCI). This implies that as women increase their level of rice commercialisation, they are more likely to be empowered. Similarly, it may be inferred that as more women become empowered, they are also more likely to engage in rice commercialisation activities as they are also more likely to access more resources required in rice commercialisation. Generally, the level of women's empowerment had a positive linear relationship with the increase in rice commercialisation among SSFs and among those involved in the system of rice intensification (SRI members) but not among MSFs.

The distribution of the level of women's empowerment by multidimensional poverty index (MPI) status revealed that more empowered women were more likely to be categorised in the MPI non-poor than in the MPI poor category. These findings imply that the level of women's empowerment increases with the level of commercialisation: alternatively stated, empowered women are more likely to commercialise.

Regression analysis revealed that the RCI, household size, MPI, female headship, participation in non-farm activities, level of education, and land holdings of the household were the most important predictors for

women's empowerment (p = 0.05). These findings imply that improvement in the poverty level measured by the MPI makes a significant contribution to the empowerment outcome. Similarly, participation in rice commercialisation and a larger family size contributes to women's empowerment. Likewise, women from female-headed households are more likely to be empowered than females from households that are headed by men.

Generally, the study has established that rice commercialisation in Mngeta Division makes a significant contribution towards women's empowerment. The level of livelihood improvement is an important predictor of women's empowerment. Therefore, government and non-governmental organisations should focus on interventions that improve rice commercialisation, including connecting villages to electricity, the improvement of feeder roads, and promoting gender dialogue in the community to foster changes in cultural and social relations that act as barriers for reducing women's empowerment.

1 INTRODUCTION

The importance of women's empowerment in transforming rural livelihoods cannot be overemphasised. However, many efforts to empower women economically, especially those involved in agricultural related livelihoods provide inconclusive evidence on how women's empowerment transforms power relations at the household and community levels (Jeckoniah 2013). There is consensus in the literature that women's empowerment is beneficial in many aspects (Wallerstein 2006; KIT, Agri-ProFocus and IIRR 2012). Nevertheless, development interventions that aim to empower women and ignore the underlying inequitable workload, especially unpaid care work, may achieve their goal of empowering women but also inadvertently increase women's workload (IFAD 2016). This paper explores whether and to what extent the ongoing efforts to engage women in agricultural commercialisation initiatives in Mngeta Division and Kilombero District in general are empowering and inclusive.

Empowerment and women's empowerment in particular is a multifaceted concept, which is defined and measured using many indicators (Narayan 2002). The concept of empowerment revolves around the prevailing power imbalance between men and women, which is also said to be the origin of gender inequalities in many countries (Sevefjord and Olsson 2004, cited in KIT *et al.* 2012). The government of Tanzania and non-governmental organisations espousing for women's empowerment have for many years focused on efforts to reduce inequalities between men, women, and other marginalised groups within society (KIT *et al.* 2012). While some achievements have been recorded with regard to livelihood improvement, the question remains as to whether such efforts are inclusive and whether they have had positive impacts on women's empowerment, especially among women engaged in agricultural related livelihoods.

Women's empowerment is generally understood as 'a process by which those who have been denied the ability to make strategic life choices acquire the ability to do so' (Kabeer 2005). In the context of agricultural commercialisation, choices entail the possibility of having alternatives; hence having different pathways within agricultural commercialisation. The attainment of such choices may have dissimilar impacts on people's lives since they are constrained by many different factors at the household and community levels. Women's empowerment in the context of agricultural commercialisation entails changes in gender roles and relations in order to enhance women's ability to shape their lives (Laven *et al.* 2009; Jeckoniah 2013).

The emphasis on women's empowerment is partly inspired by the fact that women often suffer from different types of powerlessness in social, economic, and political spheres of life (Ragasa *et al.* 2014; Gupta 2017; Nyange, Lyimo-Macha and Sikira 2017). Failing to provide women with equal opportunities is not just a violation of a woman's human rights, but it is detrimental to efforts to improve economic growth (FAO 2011). Efforts to empower women who are engaged in agricultural related livelihoods have multiplier benefits on the livelihoods of entire families and communities including: increased productivity, reduced hunger and malnutrition, as well as improvement in rural livelihoods and reduction of poverty. Such empowerment may also promote better governance (Malhotra, Schuler and Boender 2002; Wallerstein 2006; KIT *et al.* 2012).

Across sub-Saharan Africa (SSA), initiatives to promote the empowerment of women and girls have gained popularity as a means to help female farmers increase their bargaining position to rectify historical power imbalances between them and men. Women's empowerment is a multidimensional process that helps individuals or groups of women to realise power within themselves in different spheres of their lives, which is important for them to attain an improved level of livelihood. Empowered women realise the power within them and become able to network with like-minded individuals; hence, this drives an individual or group movement to pursue their strategic position in life through the decisions they make. Empowerment also enables them to demand the enforcement of their rights as well as effective economic power and participation in decision-making processes, both at the household and community levels (Pan 2017). Within the rich body of feminisation literature and research on agricultural commercialisation, the liberal economics

perspective offers a relatively confined concept of women's empowerment as ultimately being about change within the income, expenditure, and asset or resource domain of the domestic political economy (Gupta 2017; Dancer and Hossain 2018). Despite its limitation, this perspective was considered measurable and relevant, and hence it is used in this study.

In Mngeta Division, women are less empowered compared to men in many aspects including: education attainment, income, control over their own income, bargaining power in selling their own produce and labour, participation in decision-making bodies, as well as access to production inputs and employment opportunities (Basu and Basu 2001; Isinika *et al.* 2020). Tanzanian women, especially those from rural farming households, have less access to and less control over assets and resources, information, and decision-making than men (URT 2010). Most approaches and efforts to empower women who are engaged in agricultural related livelihoods have often focused on mobilising rural women in producer and marketing groups for easy access to production inputs, extension services, as well as facilitating market access by smallholder farmers, men, and women (URT 2006). This paper explores how women engagement in rice commercialisation impacts on their empowerment in relation to various efforts to empower them through service delivery, as alluded to above.

Agricultural commercialisation is recognised as a fundamental driver of economic growth and poverty reduction (Poulton and Chinsinga 2018). According to Poulton (2017), agricultural commercialisation refers to a process of agricultural transformation where farmers increasingly depend on markets to sell their products, but also for acquisition of inputs. The process intends to transform the agricultural sector into a modern, commercial, highly productive, resilient, and competitive entity in the national and international market (Ogutu and Qaim 2018). As women engage in agricultural commercialisation, it is anticipated that power relations at the household level will change to reflect the new roles and responsibilities for men and women.

Given the existing gender inequalities in almost all rural communities in Tanzania, it is important to have a better understanding of how changes in gender roles that come with rice commercialisation affect men's and women's livelihood outcomes. Since rice cultivation has gained importance as a food crop as well as a source of employment and income in Mngeta Division (Isinika *et al.* 2020), it is important to have empirical evidence on whether in the process of rice commercialisation, women's empowerment has occurred. The analysis should also establish enablers and hindrances to women's empowerment. This paper explores the interplays between rice commercialisation and women's empowerment in Mngeta Division. Such findings will inform policy formulation and practices for better livelihood outcomes and economic development.

The drivers of rice production and commercialisation in Kilombero District as highlighted by Isinika *et al.* (2019) are traced back to 1987, when the government established a large-scale farm in Mngeta Division. During the 1990s, the farm was abandoned, but in 2008, the farm was sold to a private investor, who established Kilombero Plantation Limited (KPL) to produce rice and maize on more than 5,000 hectares (Isinika and Mwajombe, forthcoming). The farm is surrounded by numerous small- and medium-scale farmers, who are expected to benefit from the large-scale investor as prescribed in the commercialisation literature. This framework is also promoted by the government under the Southern Agricultural Growth Corridor of Tanzania (SAGCOT), where government facilitation through infrastructure development and institutional improvement was expected to benefit both the investor (from reduced production costs) and the smallholders through technology spillovers and market linkages (Dancer and Sule 2015, cited in Isinika *et al.* 2020). These initiatives were anticipated to address some of the barriers that negatively impede on farmers' efforts to improve their livelihood through increased rice cultivation and marketing linkages. Therefore, this paper explores the impact of rice commercialisation on women's empowerment in Mngeta Division.

2 METHODOLOGY

This paper uses data collected for the first round of Agricultural Policy Research in Africa (APRA) programme that is implemented in six African countries.[1] The APRA study in Tanzania focused on rice commercialisation in Mngeta Division in Kilombero District, Morogoro Region. The study area was purposively selected to assess the impact of rice commercialisation on the livelihood and empowerment of farmers engaged in this economic activity. The drivers of rice commercialisation in the study area include: KPL as a large-scale farmer, medium-scale farmers, as well as rural electrification. Other factors are: the migration of people and livestock, and improvement in farming practices (system of rice intensification – SRI). These were hypothesised to generate additional income for men and women in the study area, which will transform their livelihood outcomes. It was hypothesised that small-scale farmers will benefit from the spillover effects from large- and medium-scale farmers in terms of technology transfer, adoption of improved rice-farming practices, and access to processing facilities where there is connectivity to electricity and marketing arrangements.

A preliminary survey in the study area revealed that the availability of these services has resulted in different forms of agricultural commercialisation. Hence, it was considered a good case to assess whether rice commercialisation has had different impacts on women's empowerment and the livelihood of small-scale farmers. The methodological approach adopted for the study is underpinned by the conceptual thinking on agricultural commercialisation (Poulton 2017; Wiggins 2018) whereby it is argued that agricultural commercialisation may occur because of external investment (by the government or private investors), market specialisation, farm consolidation, or a combination of these factors.

The study hypothesised that when smallholder rice farmers engage more in rice commercialisation, it will stimulate economic growth, which ultimately leads to poverty reduction and empowerment outcomes. In order to assess the impact of rice commercialisation on women's empowerment, several hypotheses were explored, including whether there are gender differences in the control over the plots with different values, and whether men exert control over the use of outputs even in plots which they don't directly manage. The analysis also assessed whether women provide more labour in rice production and marketing where they have an ownership stake in a plot, manage the plot, or have some control over the use of plot outputs. Other issues included whether hired labour is more likely to be supplied where men own a plot, manage the plot, and have control over the use of plot outputs; the plot is more valuable or has better soil quality; and the impact of women training in farming skills. For instance, what is the impact of using SRI on women's empowerment?

2.1 Sampling

Considering the strong influence of rural electrification on rice processing, and hence commercialisation, stratified sampling was employed to place villages in three categories, according to their electricity status, classifying them as: (i) with electricity by the time of the 2016/17 rice production season; (ii) gaining electricity between 2017/18 and 2018/19; and (iii) without electricity by 2019. This was done to assess the temporal effect of electrification on rice commercialisation.

These criteria were established in order to be able to compare the longer-term effects of electrification as one of the drivers of commercialisation, comparing between villages in the three categories. Farm households from which sampling was done were classified as small-scale farmers (SSFs) if they cultivated five hectares or less and as medium-scale farmers (MSFs) if they cultivated more than five hectares. The third category included those implementing different aspects of SRI. The classification of farmers by farm size into small and medium reflects the local contexts as reported during the FGDs. Participants of FGDs classified farms by size as follows: 2–4ha or less as small; 2.5–20ha as medium; and 8–80ha or above as large (Isinika and Mwajombe, forthcoming).

However, the definition of farm size limits varied between villages. Final classification into SSFs and MSFs was therefore accomplished by post-

stratification. Hence, the sample which was used for the computation of the rice commercialisation index (RCI) had 506 respondents, comprising 330 SSFs (15.2 per cent female, 84.8 per cent male), 73 MSFs (2.7 per cent female, 97.3 per cent male), and 103 SRI members (9.7 per cent female, 90.3 per cent male). The qualitative and quantitative data were simultaneously collected in all ten villages using face to face interviews and structured questionnaires. A total of 116 farmers participated in FGDs (36.2 per cent female, 63.8 per cent male). There were 24 key informants (16.7 per cent female, 83.3 per cent male), including the farm manager of KPL, the SRI coordinator from KPL, and the District Agriculture, Irrigation and Cooperative Officer (DAICO) from Kilombero District.

2.2 Data analysis

Qualitative data were transcribed verbatim and organised into themes that represent the key drivers of rice commercialisation and women's empowerment in the study area. The emerging themes were then organised and compared. Additionally, in-depth interviews and timelines reported during FGDs enabled researchers to establish the trend of rice commercialisation initiatives in the area since the 1980s up to 2017. The key drivers for rice commercialisation included: the establishment of large-scale rice farms during the 1980s, the improvement of transport and communication infrastructure, rural electrification, booming mobile money services, the migration of agro-pastoralists into Kilombero, as well as animal traction.

The analysis of quantitative data was done on two levels. First, the level of women's empowerment was computed by developing the composite women's empowerment index, and then the degree of rice commercialisation attained by different categories of farmers was computed using Excel and Stata software. To analyse the impact of rice commercialisation on women's empowerment, the household bargaining model was used where women's empowerment in terms of women's bargaining power in decision-making and control over assets and income was used as a proxy indicator for their empowerment according to Mabsout and van Staveren (2010).

2.3 Measuring women's empowerment

The measurement of women's empowerment adopted the indicators for measuring domestic decision-making and those measuring either access to or control over resources (Vijayamohanan and Asalatha 2012). These two aspects (access and control) interact, since the indicators of domestic decision-making tend to focus on household incomes and asset endowment, including land. The proxy indicators of these two variables also feature frequently in equations for measuring women's empowerment, which reflect choice, control, and power. Other proxy indicators for measuring women's empowerment used in this paper selected from among those proposed by Dancer and Hossain (2018) include: (i) decision-making with respect to agricultural production; (ii) control over resources; (iii) access to and control over income as well as unpaid care work; and (iv) use of time in household chores and in production activities.

Women's empowerment was determined by developing a composite women's empowerment index scale as proposed by Malapit *et al.* (2017) in the Women's Empowerment in Agriculture Index (WEAI). The WEAI measures the empowerment, agency, and inclusion of women in the agriculture sector in an effort to identify ways to overcome prevailing obstacles and constraints. It has been argued (Kabeer 2005) that women's empowerment and disempowerment may be influenced by factors within and beyond household relations. In terms of agricultural commercialisation, women's empowerment translates into women's ability to influence power relationships in the contexts of markets, governance, prices or wages, and labour rights (Dolan 2004; Tallontire *et al.* 2005).

Women's empowerment is also reflected when women engage in the paid and unpaid care work they undertake in order to improve food and nutrition security at the household level. The cumulative score for the women's empowerment index (WEAI) was computed by averaging the score from respective indices of women's empowerment, which comprised the indicators for care work, control of income, women's decision-making regarding agricultural plots, dietary diversity, food security, and engagement in collective action. The scores were further categorised into low, medium, and high level of women's empowerment (low 0.0–0.5, medium 0.6–0.7, and high 0.8–1). This women's empowerment categorisation level adopts the human development index whereby the score for the human development index also varies between the value of zero and one.

The probability of one being categorised into different levels of women's empowerment was estimated using an ordinal logistic regression, which was specified as follows:

$$P(y) = \frac{e^{\alpha} + \beta_1 X_1 + \ldots + \beta_n X_n}{1 + e^{\alpha} + \beta_1 X_1 + \cdots + \beta_n X_n}$$

where:

P(y) = score on women's empowerment index (WEI) specified as low (L), medium (M), and high (H);
α = the intercept of the equation;
e = error term;
X_1-X_n = predictor variables;
$ß_1$-$ß_n$ = coefficients to be estimated;
X_1 = age difference (between spouses/head and female respondent);
X_2= education level of woman;
X_3 = household size (number of household members);
X_4 = woman total non-farm income;
X_5 = total non-farm income;
X_6 = rice commercialisation index (RCI);
X_7 = sex of household head (1= head is female, 0 = head is male);
X_8 = land size;
X_9 = poverty status (MPI status: 1 = MPI poor, 0 = not MPI poor);
X_{10} = distance from tarred road (close/further away/ remote)/distance to nearest large milling machine
X_{11} = electrification (1 = electrified village, 0 = non-electrified village)

2.4 Measuring rice commercialisation

This paper adopted the procedure for measuring the RCI[2] established by Isinika *et al.* (2020) in which the RCI was computed as a percentage of rice that is marketed out of what was produced. A similar approach has also been used by other scholars (Muriithi and Matz 2015; Von Braun 1994, cited in Cazzuffi, McKay and Perge 2018). The index varies from zero where nothing was sold to one where all rice produced was sold. A comparison of rice commercialisation levels was made for small-scale farmers (SSFs), medium-scale farmers (MSFs), and SRI members. Comparison was also made by sex as well as by the level of empowerment. This paper also explores whether the rice commercialisation process was inclusive or not. For this purpose, the sample was divided into five quintiles, ranging from the lowest RCI (0–20 per cent) up to the highest (81–100 per cent). The quintiles were then used as explanatory variables together with other household socioeconomic characteristics, in a regression model where women's empowerment was the dependent variable.

2.5 Measuring livelihood and its indicators

The level of household welfare was computed in order to compare the level of women's empowerment and the corresponding household welfare. It was hypothesised that rice commercialisation in the study area will result in improved welfare among those who are engaged in different activities of rice commercialisation and that it will also vary with, or reflect, the level of empowerment. The most common approach in the literature to measure the level of livelihood uses income, assets, food security, subjective wellbeing, or multidimensional poverty (Alkire *et al.* 2015). This paper adopted the approach established by Isinika *et al.* (2020) as guided by Poulton (2017)[3] in which the household livelihood wellbeing level was estimated using the multidimensional poverty index (MPI) as proposed by Alkire and Santos (2013) and Alkire *et al.* (2015). The MPI has been adopted as it captures a wider range of variables including assets, health, education, and nutrition that reflect the quality of life within a household. The MPI therefore represents the proportion by which a household is deprived, higher scores representing more deprivation and hence more poverty.

3 RESULTS AND DISCUSSION

3.1 Descriptive statistics

3.1.1 Access to resources and control over resources

Access to and control of resources determines who stands a better chance in using the opportunity spaces that come with agricultural commercialisation. The majority of rice farmers in Mngeta Division own the land that they use for rice cultivation. About 31.2 per cent of respondents own the land, which has been acquired through purchase. Other common means of land ownership were: renting, 27.1 per cent, allocation by village government, 15.8 per cent, and inheritance from the man's family, 9.7 per cent. The least common forms of land acquisition included those acquired through traditional leaders and being allocated by a company. Also, land inheritance from a woman's family was not common for both men and women (1.5 per cent and 8.5 per cent respectively): see Table 3.1.

According to the findings presented in Table 3.2, about one third (33 per cent) of all types of land acquired had legal status of ownership (statutorily registered) and about a quarter of them (26.8 per cent) had some legal documents although they were not registered. For 10.3 per cent, ownership of the plot had been verbally authorised. Further analysis of the status of land ownership further shows that of all the acquired land plots, 87.2 per cent had a man's name on the legal document, only 9.9 per cent had a woman's name, and very few (5.7 per cent) had joint ownership, having the names of both the husband and wife appearing on the document. These findings imply that land acquisition and ownership status in Mngeta Division reflect a gender bias.

The findings presented in Table 3.3 compare across all acquisition sources the proportion of plots acquired by male and female household heads. The findings show that there was a significant difference between the proportion of land plots acquired by men and women. Out of 1,307 plots, men claimed possession through various means for 89.1 per cent of the plots compared to only 10.9 per cent of the plots claimed by female-headed households. Out of plots that were purchased, men acquired 89.2 per cent compared to only 10.8

Table 3.1 Means of acquiring plots by sex of household head (n = 537)

How was the plot acquired?	Male		Female		All
	Frequency	Percentage	Frequency	Percentage	Percentage
Purchased	364	31.2	44	31.0	31.2
Rented	317	27.2	37	26.1	27.1
Allocated by local government	198	17.0	8	5.6	15.8
Inheritance after death or from man's family	104	8.9	23	16.2	9.7
Cleared the land and planted permanent crops	73	6.3	8	5.6	6.2
Borrowed or used free of charge	30	2.6	4	2.8	2.6
Inheritance after death from woman's family	18	1.5	12	8.5	2.3
Allocated by man's clan	22	1.9	1	0.7	1.8
Received as a gift	17	1.5	1	0.7	1.4
Allocated by traditional leader	10	0.9	0	0.0	0.8
Allocated by woman's clan	9	0.8	3	2.1	0.9
Used as a customary mortgage	3	0.3	0	0.0	0.2
Allocated by agricultural company	0	0.0	1	0.7	0.1
Total count	1,165	100.0	142	100.0	100

Note: The total is more than 537 due to multiple responses.
Source: Authors' own.

Table 3.2 The status of land ownership (n = 537)

Status of household interest on the plot	Frequency	Percentage
Statutorily registered	412	33.0
Documented but not registered	335	26.8
Undocumented but verbally agreed	241	19.3
Undocumented and used without permission	16	1.3
Don't know	245	19.6
Total	1249	100.0

Note: The total is more than 537 due to multiple responses.
Source: Authors' own.

per cent for women, and for land that had been rented, males accounted for 89.5 per cent compared to only 10.5 per cent for women. Furthermore, a relatively higher proportion of men were more likely to be allocated land by the village government or through inheritance than their female counterparts (96.1 per cent and 3.9 per cent respectively) (Table 3.3). No female was allocated land by a traditional leader, nor did they use land as customary mortgage. This should be expected since only 12.3 per cent of the households in the sample are headed by women. Moreover, the majority of ethnic groups in Tanzania are patrilineal where land is inherited through male heirs (Rwebangira 1996; Duncan 2014). However, females featured better in acquiring land through inheritance after the death of a man in the family (often a husband or father), where women accounted for 40 per cent of the plots. Also, one woman was allocated land by a company, being the only one in this category.

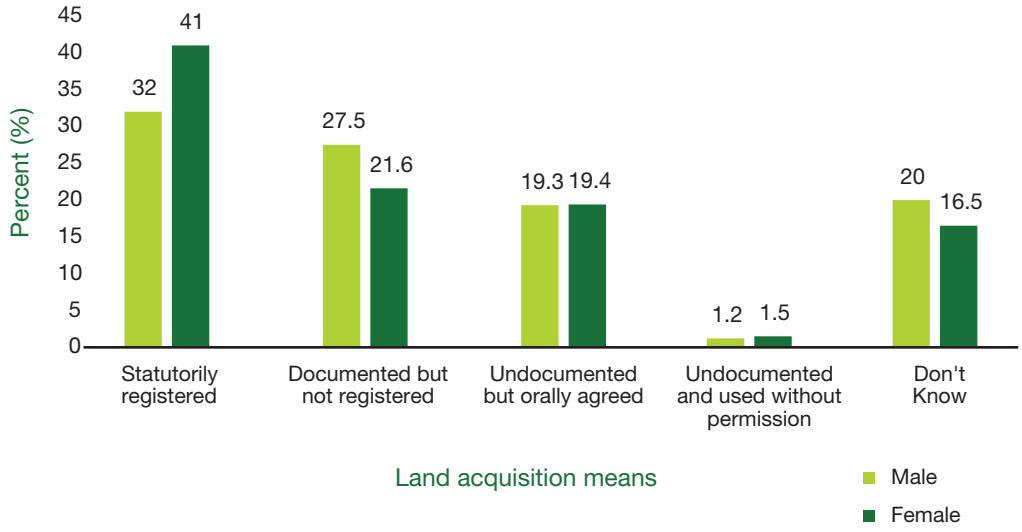
Less or lack of land ownership rights among women in Mngeta Division and an inability to make final decisions on land use at the household level creates additional barriers in their effort towards self-empowerment through rice commercialisation. The literature on women's empowerment among agrarian communities shows that intra-household decision-making on land use and land ownership practices have an impact on women's engagement and how they benefit from agricultural commercialisation initiatives (Dancer and Tsikata 2015). The findings from this study further show that there was a difference between men's and women's land ownership rights such that more women owned land with statutory rights; 41 per cent women and 31.9 per cent men respectively (see Figure 3.1). The relatively higher incidence of women legally owning land is probably due to a recent process in Kilombero District, and in the study area in particular, where all farm plots have been registered, giving rights to land owners (men and women) by issuing a certificate of customary right of occupancy, as guided by the Tanzania Land Use Planning Act of 2007 (URT 2007). This can be explained by the fact that the common means for individuals to acquire land is through purchase; the purchased piece of land is more likely to have statutory rights of ownership.

Table 3.3 Means of plot acquisition by sex of household head

Acquiring means	Male		Female		Total		Test statistics
	N	%	N	%	N	%	
Allocated by local government	198	96.1	8	3.9	206	100	Chi2 value = 57.52 P-value = 0.00
Allocated by traditional leader	10	100.0	0	0.0	10	100	
Allocated by agricultural company	0	0.0	1	100.0	1	100	
Allocated by man's clan	22	95.7	1	4.3	23	100	
Allocated by woman's clan	9	75.0	3	25.0	12	100	
Inheritance after death from man's family	104	81.9	23	18.1	127	100	
Inheritance after death from woman's family	18	60.0	12	40.0	30	100	
Received as a gift	17	94.4	1	5.6	18	100	
Purchased	364	89.2	44	10.8	408	100	
Cleared the land and planted permanent crops	73	90.1	8	9.9	81	100	
Borrowed or used free of charge	30	88.2	4	11.8	34	100	
Used as a customary mortgage	3	100.0	0	0.0	3	100	
Rented	317	89.5	37	10.5	354	100	
Total	1165	89.1	142	10.9	1307	100	

Note: The total is more than 537 due to multiple responses.
Source: Authors' own.

Figure 3.1 Plot ownership status by sex



Source: Authors' own.

Table 3.4 Decision-making on household plots for all crops

Variable	Male		Female		Total	
	N	%	N	%	N	%
Who primarily manages the household plot?	1,185	54.3	997	45.7	2,182	100
Who primarily decides how the outputs from the plot should be used?	1,185	53.9	1,013	46.1	2,198	100

Source: Authors' own.

Figure 3.2 Land ownership by quality of soil and by sex (Chi2 value = 2.84, P = 0.24)

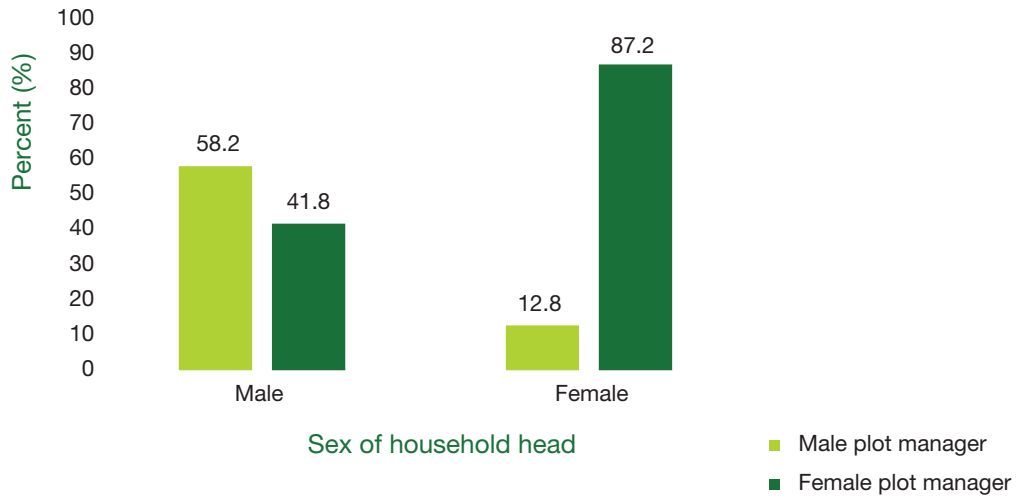
Source: Authors' own.

3.1.2 Decision-making over land

The decision to engage in different aspects of rice commercialisation in Mngeta Division as it is in many other rural areas of Tanzania depends on the ability and power to make decisions over how the piece of land should be used, and the use of income accrued from agricultural production (see Table 3.4).

The study findings as presented in Table 3.4 revealed that a higher proportion of men than women were primarily involved in managing the plot (54.3 per cent compared to 45.7 per cent). Men also made the final decision on how the plot should be used (53.9 per cent and 46.1 per cent for men and women respectively). This means that, in addition to having less land ownership rights, women in

Figure 3.3 Land management by type of headship



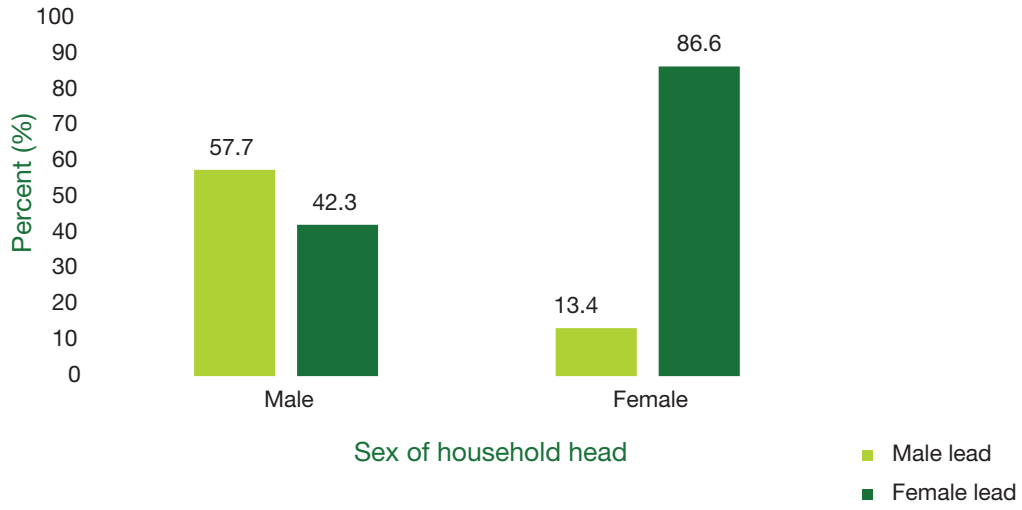
Source: Authors' own.

the study area also lack power to make the final decision over the family land. The findings with regard to women's ownership of resources in Mngeta Division suggest that women have more barriers to empowerment through farming activities since the ownership and decision-making regarding land use is dominated by male family members. Controls of land by men may limit the ability of women, especially in male-headed households, to engage in rice commercialisation such as renting land or engaging in contract farming arrangements.

Respondents were further requested to specify by naming two household members who primarily make decisions over what to plant or what inputs to use, and decisions regarding the use of outputs obtained from the rice plots (see Figure 3.2). The findings indicate that men dominated the decision-making process regarding how the plot of rice had to be used (54.6 per cent and 45.4 per cent for men and women respectively). Comparison within the same sex shows that a higher proportion of men were responsible for making decisions regarding the use of output from rice plots (being 93.6 per cent and 80.6 per cent for men and women respectively).

Further, the study revealed that control of land in terms of managing farming practices for rice cultivation depends on the quality of the plot used for rice production (see Figure 3.2). There was a small gender difference regarding management of land plots of different soil quality (see Figure 3.3). Females in male-headed households (MHHs) were more likely to manage plots of good soil quality than females in female-headed households (FHHs) (70.3 per cent compared to 63.9 per cent respectively), but this difference was not statistically significant ($p = 0.24$). The dominance of women in controlling plots of good soil quality (Figure 3.2) is

Figure 3.4 Decision-making on use of the output



Source: Authors' own.

probably due to the fact that the majority of women who own land have acquired a piece of land that they use for rice production through rent and purchase; therefore they wisely choose to rent good-quality land plots.

3.1.3 Decision-making regarding agricultural production

In addition to gender differences regarding participation in agricultural production, the final decision on how the income accrued from agricultural production is used is the most important aspect in determining one level of women's empowerment.

This study found that generally men took the lead in making important decisions over the outputs from rice plots in male-headed households (57.7 per cent for MHHs compared to 42.3 per cent for FHHs) (see Figure 3.4). There was no significant difference in decision-making between males and females who were the heads of households over produce from plots of different soil quality.

3.1.4 Men's and women's participation in unpaid care work

On average, all respondents, both men and women, spent about 6.8 hours on all forms of care work. Women spent disproportionally more time on care work than their male counterparts (4.6 hours and 7.3 hours for men and women respectively) (see Table 3.5). Cooking, caring for children and the elderly, and collecting fuel and water for household use were the most common unpaid care work tasks undertaken by men and women in the study area.

Men's and women's participation in unpaid care activities show a gendered pattern in which women on average spent more time than their male counterparts, except for collecting water for household activities, where men and women spent almost the same time on average. Women's participation in unpaid care work at the household level contributes to their disempowerment as they have less time to participate in paid economic activities than their male counterparts do.

3.1.5 Decision-making over non-farm income

The main sources of non-farm income for households in Mngeta Division include income from casual labour, regular employment, gifts, enterprise income, safety net income, and regular farm income (see Table 3.6). Overall, men received more income accrued from these sources except for income accrued from net gifts and net safety income. Women's dominance regarding these two sources of income may be explained by local government intervention towards poverty reduction, which often targets poorer members of communities, of whom the majority are women.

Such programmes include the Tanzania Social Action Fund (TASAF), which addresses poverty through cash transfers in terms of unconditional payments and access to resources such as health and school-related costs for very poor people. In some instances, the cash transfer is conditional whereby people have to perform some work before being given cash; for example, building community services infrastructure such as village road infrastructure, classrooms, dispensaries, and so forth. The findings in tables 3.6, 3.7, and 3.8 further reveal that there was a significant difference between men's and women's access to income from casual labour and from household enterprises ($p < 0.005$); fewer women had access to such sources of income. The mean amounts of income received by women was also smaller than men.

When comparing the value of non-farm income and total household income received by the household head, it is evident from Table 3.5 that total income from casual employment and from regular employment was significantly higher for male-headed households

Table 3.5 Time taken (hours) to do household care work by sex

Variable	Male		Female		Total		F-test
	Mean	Median	Mean	Median	Mean	Median	
All care work	4.6	4.0	7.3	7.0	6.8	6.0	F-value = 48.70 P-value = 0.00
Cooking	1.3	1.0	2.4	2.0	2.2	2.0	F-value = 60.93 P-value = 0.00
Child/elderly Care	1.4	1.0	1.9	1.0	1.9	1.0	F-value = 5.02 P-value = 0.03
Collecting fuel	1.4	1.0	1.6	1.0	1.5	1.0	F-value = 3.8 P-value = 0.05
Collecting water	1.3	1.0	1.4	1.0	1.4	1.0	F-value = 0.03 P-value = 0.88

Source: Authors' own.

Table 3.6 Value of various non-farm income streams

	Male		Female		Total		Test Statistics	
Statistics	Mean	Median	Mean	Median	Mean	Median	F-value	P-value
Total casual income	196,575	50,000	60,321	30,000	142,899	40,000	9.24	0.003
Total regular employment income	1,856,042	1,250,000	331,714	280,000	1,511,839	480,000	4.60	0.040
Total income others	1,468,417	677,500	330,333	329,000	1,183,896	601,000	2.38	0.136
Net investment income	782,548	300,000	446,036	199,000	700,615	260,000	0.91	0.343
Net gift income	192,285	112,400	206,661	91,000	198,286	100,000	0.04	0.836
Social safety nets income	141,417	96,000	81,154	90,0000	110,080	90,000	1.28	0.269
Net enterprise income	1,942,672	740,000	698,532	347,000	1,426,486	480,000	6.92	0.009
Total female regular farm income			30,500	30,500	30,500	30,500	30,500	

Source: Authors' own.

Table 3.7 Total non-farm income from various sources

Sex	Households (N)	Total mean	Std. deviation	Median	Test statistics
Male	1,490	269,375.6	1,457,409.5	.0	F-value = 26.5 P-value = 0.000
Female	1,407	627,84.9	390,505.2	.0	
Total	2,897	169,039.7	1,084,800.7	.0	

Source: Authors' own.

Table 3.8 Total household income by sex of household head

Sex	Households (N)	Mean	Std. deviation	Median	Test statistics
Male	444	2,827,012.5	4,853,478.0	1,249,000.0	F-value = 6.6 P-value = 0.010
Female	62	1,221,898.9	1,927,896.7	521,000.0	
Total	506	2,630,338.5	4,625,008.7	1,115,500.0	

Source: Authors' own.

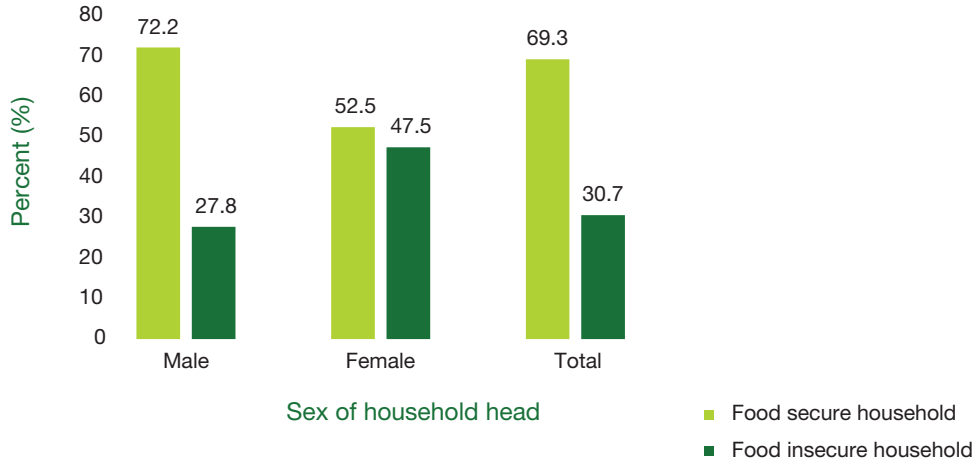
compared to female-headed households. The mean non-farm income was 269, 376 TZS per annum for men compared to 62,785 TZS for women ($F = 26.5$; $p < 0.005$). This finding shows that male and female-headed households do not receive comparable income from their different household sources in which men's income was significantly higher than that of their female counterparts (tables 3.7 and 3.8). Household food security is another indicator of empowerment as discussed in the next section.

3.1.6 Food security

Household food security was estimated by developing the household food security index using the respondents' own assessment of months they had experienced food insecurity and their score on the dietary diversity index. A significantly higher proportion of the MHHs were more food-secure compared to FHHs. Overall, 69.3 per cent and 30.7 per cent of the MHHs and FHHs respectively reported being food-secure (Figure 3.5).

The distribution of the food security status varied across villages such that respondents from villages with electricity were more likely to be categorised in the food-secure status than those from villages without electricity (70.6 per cent and 68.5 cent respectively) (see tables 3.9 and 3.10). While it was found that farmers from villages without electricity produce more rice than villages with

Figure 3.5 Food security status



Source: Authors' own.

Table 3.9 Food security by electricity status and category of farmer

Electricity status	Farmer category	Food security status of a household						Chi²	P-value
		Food-insecure household		Food-secure household		Total			
		Freq.	%	Freq.	%	Freq.	%		
Without electricity	Small-scale farmer	63	34.6	119	65.4	182	100	7.024	0.03
	Medium-scale farmer	8	16.7	40	83.3	48	100		
	SRI farmer	11	42.3	15	57.7	26	100		
	Total	82	32.0	174	68	256	100		
With electricity	Small-scale farmer	37	34.6	70	65.4	107	100	2.68	0.26
	Medium-scale farmer	2	22.2	7	77.8	9	100		
	SRI farmer	12	22.6	41	77.4	53	100		
	Total	51	30.2	118	66.8	169	100		
Total	Small-scale farmer	72	31.6	156	68.4	228	100	6.66	0.036
	Medium-scale farmer	10	17.5	47	82.5	57	100		
	SRI farmer	23	29.1	56	70.9	79	100		
	Total	133	31.3	292	68.7	425	100		

Source: Authors' own.

Table 3.10 Food security by status of farmer category and by sex

Electricity status	Sex	Food security status of a household						Chi²	P-Value
		Food-insecure household		Food-secure household		Total			
		Freq.	%	Freq.	%	Freq.	%		
Small-scale farmer	Male	72	31.6	156	68.4	228	100	4.22	0.04
	Female	23	46.9	26	53.1	49	100		
	Total	95	34.3	182	65.7	277	100		
Medium-scale farmer	Male	10	17.5	47	82.5	57	100		
	Total	10	17.5	47	82.5	100	100		
SRI farmer	Male	16	23.9	51	76.1	67	100	2.99	0.84
	Female	5	50.0	5	50.0	10	100		
	Total	21	27.3	56	72.7	77	100		
Total	Male	126	30.7	285	69.3	411	100	9.15	0.02
	Female	28	47.5	31	52.5	59	100		

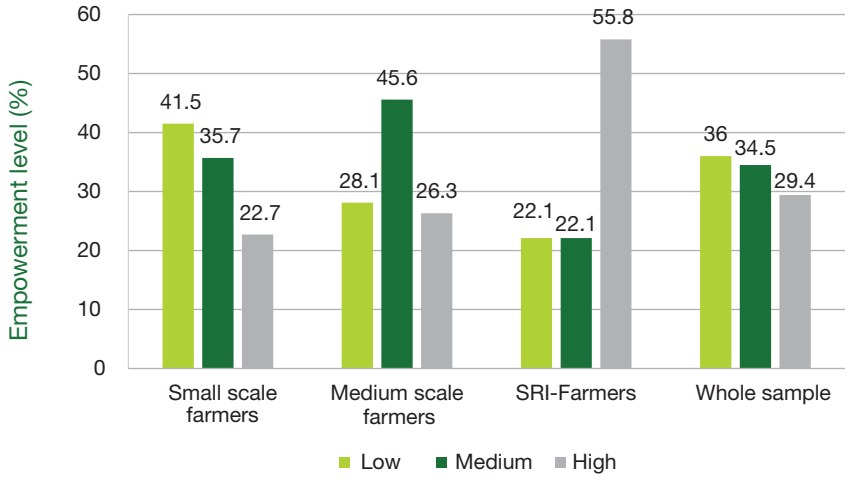
Source: Authors' own.

Table 3.11 Dietary diversity scores

Farmer category after post-stratification	Sex	Did not meet minimum dietary diversity	Met minimum dietary diversity	Total	Chi²	P-value
Small-scale farmer	Male	74	154	228	0.001	0.979
		32.5%	67.5%	100.0%		
	Female	16	33	49		
		32.7%	67.3%	100.0%		
		90	187	277		
		32.5%	67.5%	100.0%		
Medium-scale farmer	Male	14	43	57		
		24.6%	75.4%	100.0%	0.30	0.58
		14	43	57		
		24.6%	75.4%	100.0%		
SRI farmer	Male	19	48	67	00.0	0.99
		28.4%	71.6%	100.0%		
	Female	2	8	10		
		20.0%	80.0%	100.0%		
		21	56	77		
		27.3%	72.7%	100.0%		
Total	Male	107	245	352		
		30.4%	69.6%	100.0%		
	Female	18	41	59		
		30.5%	69.5%	100.0%		
		125	286	411		
		30.4%	69.6%	100.0%		

Source: Authors' own.

Figure 3.6 Levels of women's empowerment by farmer category



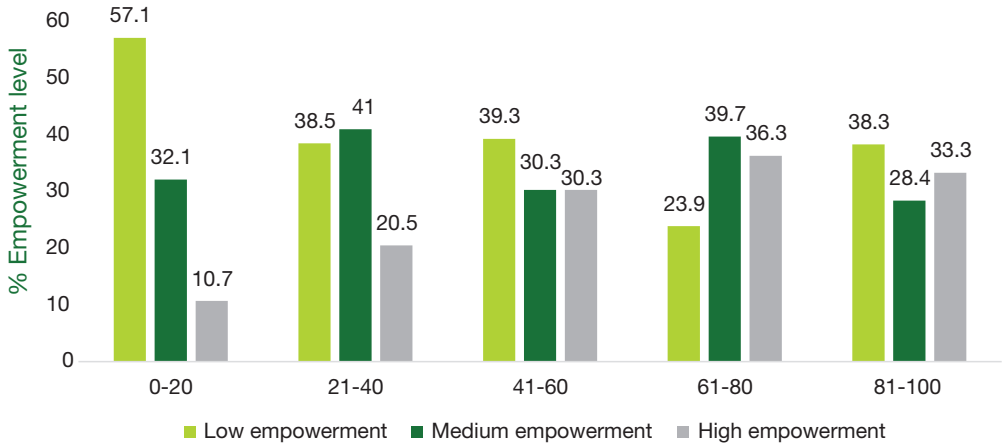
Source: Authors' own.

electricity, the difference is attributable to the availability of land in villages without electricity. The relatively higher food security status in villages with electricity despite the constraint on land for expansion is attributable to more rice commercialisation. The findings also indicate that access to land was inversely related to food insecurity, implying that acquisition of more land increased food security. Conversely, these findings also imply that food-secure households are more likely to acquire more land.

Conversely, the food insecurity status increased with age of the household head and the household size. The increase in the size of the household has a positive influence on the household attaining food security. This is associated with supply of family labour which is an important input in agricultural production activities.

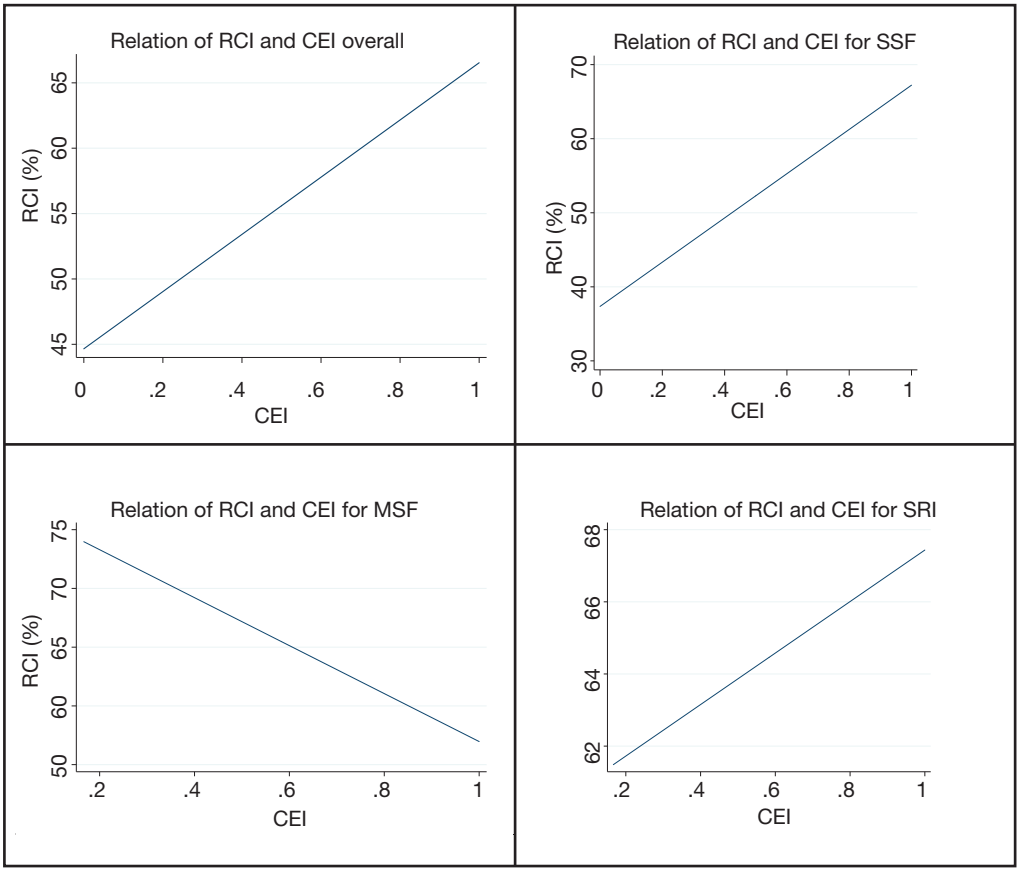
Overall, about two thirds (69.6 per cent) of all the respondents met the minimum dietary diversity requirements. Medium-scale farmers were more likely to have greater dietary diversity (75.4 per cent) than small-scale farmers (67.5 per cent) and SRI farmers (72.7 per cent) (Figure 3.6). Respondents from villages with electricity had higher dietary diversity scores (72.2 per cent) than those from villages without electricity (67.2 per cent) (Table 3.11). Attaining food security status and

Figure 3.7 Distribution of level of women's empowerment by RCI



Source: Authors' own.

Figure 3.8 Women's empowerment and rice commercialisation by farmer categories



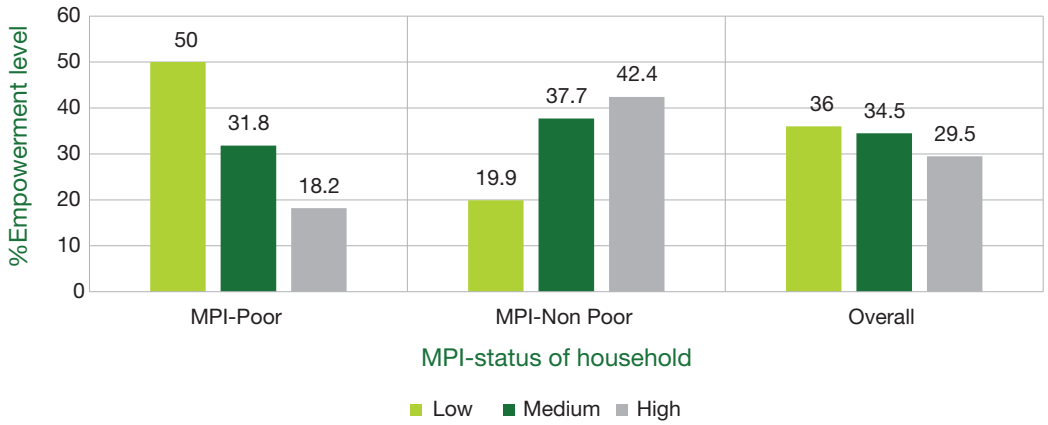
Source: Authors' own.

access to adequate food diversity are important steps towards women's empowerment.

3.2 Women's empowerment

The analysis of women's empowerment revealed that 36 per cent of the respondents were categorised in the low level of empowerment, 34.6 per cent were in the medium level of empowerment while about one third (29.4 per cent) were categorised into the highest empowerment level (Figure 3.7). Women's empowerment was found to increase with the age of the household head and the age of a married woman. Women's empowerment also increased with the level of education of the household head and the

Figure 3.9 Distribution of empowerment by levels of MPI



Source: Authors' own.

level of education of a woman. It also increased with household size and land size ownership. The level of women's empowerment was highest (42.9 per cent) among women living as single people and lowest (0 per cent) among those living under a cohabitation arrangement. There was a high proportion of women categorised in the higher level of empowerment in villages with electricity (39.4 per cent) compared to women in villages without electricity (23.1 per cent).

The level of women's empowerment varied with farmer categories whereby medium-scale farmers had a higher proportion of women categorised in a higher level of empowerment than small-scale and SRI farmers (Figure 3.8). The level of women's empowerment also increased with increasing women's income (farm and non-farm incomes). The level of women's empowerment was highest among women who had higher income than their spouses and it was lowest among households where men and women had about the same level of income.

3.2.1 Distribution of women empowerment (by levels of RCI)

The trend of women's empowerment distribution by their level of participation in rice commercialisation indicated that women who were more empowered were more likely to be categorised in the higher quintiles along the rice commercialisation index. This implies that as women increase their level of rice commercialisation, they are more likely to be empowered. Conversely, it may be inferred that women who are empowered are also more likely to engage in rice commercialisation activities.

Generally, the level of women's empowerment had a positive linear relationship with an increase in rice commercialisation for smallholder farmers and among those involved in the system of rice intensification. However, it was found that the level of women engagement in rice commercialisation for medium-scale farmers had a negative relationship regarding their empowerment, although it was an important predictor for women's empowerment. This negative relationship can probably be explained by the availability of land about which women are not necessarily consulted or involved in. Where women are not consulted over decisions regarding rice farm expansion, they have less control over land assets in general. The findings from this study revealed further that many of the medium-scale farmers are located in remote villages where land is available for agriculture expansion but where there is poor access to electricity. Although farmers face the additional cost of transporting their rice for processing, they equally benefit from the opportunities brought by electricity as a spillover effect of commercialisation in villages without electricity. This leads us to the question: 'How does the level of women's empowerment relate to the household's poverty status?'.

3.2.2 Distribution of empowerment by levels of the MPI

This study found that there were more respondents categorised as MPI poor (54.6 per cent) than those who were MPI non-poor (45.4 per cent). The distribution for the level of women's empowerment by MPI levels revealed that women who were more empowered were more likely to be categorised in the MPI non-poor (42.4 per cent) than in the MPI poor category (18.2 per cent). These findings imply that the level of women's empowerment is positively influenced by several initiatives and efforts to improve wellbeing. The relationship between women's empowerment among those classified as MPI poor and non-MPI poor was statistically different for small-scale farmers and SRI farmers ($p = 0.000$) but the relationship was not statistically significant among medium-scale farmers ($p > 0.05$).

Table 3.12 Estimate of ordinal logistic regression: determinants of women's empowerment

Variables	RCI, electrification, and HH control	Robust std error
Rice commercialisation index	0.010**	0.004
Electrification	0.444*	0.214
Education of woman	0.04	0.034
Household size	0.199***	0.047
Land size	-0.003	0.029
Multidimension poverty index status (MPI)	-1.424***	0.230
Woman non-farm income	0.000*	0.000
Head non-farm income	0.000	0.000
Age difference between head and woman	0.021	0.014
Female headship (household led by woman)	0.701**	0.303
Observations	410	
Wald Chi2 (10)	81.17	
Prob > Chi2	0.0000	
Pseudo R2	0.1132	
Log-likelihood	-398.1927	

Note: The table presents results from ordinal logistic regression estimation.

*** Significant at 1 per cent; ** significant at 5 per cent; * significant at 10 per cent.

Source: Authors' own.

Overall, the relationship between women's empowerment in villages with electricity and those without electricity as classified by the MPI was statistically significant (p = 0.000), implying that the influence of electricity on livelihood improvement as estimated by the MPI and empowerment was not equally felt among villages connected to electricity and those not connected to electricity but connotes the spillover effect. However, the factors contributing to women's empowerment are diverse as estimated using the regression model below. In the next section, we discuss the determinants of women's empowerment in Mngeta Division using regression analysis.

3.2.3 Determinants of women's empowerment in the study area

The regression model as developed under the methodology (see Section 2.3) was tested for heteroscedasticity using the robust standard errors method, and it was confirmed that there was no problem of heteroscedasticity. The model best fitted the data since the value of log-likelihood is -398.19. The value of prob > Chi2 is 0.000, which shows that the model was a good fit for the estimation of factors which influence the women's empowerment level, and that one or more coefficients of independent variables are not equal to zero.

The results of the regression analysis as presented in Table 3.12 show that out of eleven variables, six variables (scores on RCI, electrification status, household size, MPI score, women non-farm income, and female-headed households) were the most important predictors for women's empowerment (p = 0.05). These findings imply that improvement in the poverty level measured by the MPI made a significant contribution to the empowerment outcome.

Rice commercialisation was found to have a positive and significant influence on women's empowerment (p = 0.01), implying that as women get more involved in rice commercialisation activities they benefit in several ways that ultimately impact on their empowerment. The availability of electricity made a significant contribution to explaining the chances of women being empowered. The contribution of electricity to empowerment can be explained through increased value addition activities whereby women are engaged in activities such as the sorting, winnowing, processing, and selling of rice. These increased casual employment opportunities for women to sell their labour which subsequently increased opportunities to engage in other small businesses such as food vending which can earn them some income.

Women's participation in non-farm income was an important predictor of women's empowerment. Women in Mngeta Division are increasingly involved in non-farm activities such as small businesses, mobile money businesses, and food vending; these activities and opportunities have been brought about by rice commercialisation in the area. Women have greater

control over the income they receive from non-farm activities which contributes to their empowerment. Women from households headed by women were more empowered than those from male-headed households ($p > 0.05$). This is mainly due to the greater power they have regarding decisions on the use of resources, income, and other important household decisions. Women who live under a marital arrangement face some limitations in making and implementing important decisions in their favour. Men have frequently been reported in the literature as being barriers to women's empowerment efforts (Jeckoniah 2013).

The coefficient on the MPI score status was negative and it was a significant predictor of women's empowerment. This finding implies that women who were categorised as being non-MPI poor were also more likely to be categorised into the higher levels of women's empowerment.

4 CONCLUSIONS AND RECOMMENDATIONS

The overall objective of this paper was to explore the effects of rice commercialisation on women's empowerment among farmers in Mngeta Division, Kilombero District in Morogoro Region, Tanzania. The expected direct and indirect benefits from farmers' engagement in agricultural commercialisation activities through rice cultivation was expected to lead to: an improvement in livelihoods; a reduction in poverty; increased dietary diversity; and an increase in women's participation in decision-making. This was in production, marketing, and in the use of the income accrued from rice production, as well as other non-farm income-generating activities, leading to greater empowerment.

Generally, the study has established that rice commercialisation in Mngeta Division has made a significant contribution to women's empowerment, and there was also a positive linear relationship between rice commercialisation and women's empowerment. Access and ownership of important productive resources, including land and control of income accrued from farm and non-farm income, were the most important predictors for women's empowerment. Despite women acquiring some level of empowerment, the study revealed that gender inequality is still high for women living in a marital union in relation to ownership and control of resources, including land, which is the primary asset for agricultural production.

A low level of income is a constraint for the majority of women and poor men who cannot afford to buy an area of land. Regardless of the means of land acquisition, generally, men had more power in decision-making over the use of land. Men dominated decision-making on how the plot for rice cultivation was to be used and they also controlled decision-making over the use of income accrued from rice production. Women made the final decision over the area of land that they bought or rented. These gender differences regarding resources ownership in Mngeta Division suggest that women face more barriers to self-empowerment since the ownership of land falls within male dominancy. The dominant control of land by men may affect women's decision to engage in rice commercialisation, hence limiting their ability to rent land or engage in contract farming.

Moreover, women disproportionately spent more time on care work than their male counterparts; these unpaid care work tasks include cooking, care for the children, and the elderly, and collecting fuel and water for the household. Women's participation in unpaid care work at the household level contributes to women's disempowerment as they have less time to participate in paid work as well as networking activities as their male counterparts. Therefore, women's empowerment due to increased engagement in rice commercialisation activities is attained at the expense of their increased workload at household level. This is due to a lack of transformation of power relations and distribution of work at household level. Men received more income accrued from different sources of income (non-farm) at the household level except for income accrued from net gifts and net safety income.

This study established that there is gender inequality in decision-making over important livelihood issues for those living in a marital union, which affects women's empowerment. On the other hand, female-headed household heads were more empowered than women in a married couple. This is due to their ability and active participation in decision-making regarding strategic life choices, including participation at various levels and in various activities. These women also benefited from the opportunities brought about by agricultural commercialisation. Closing the gender gap in women's empowerment in agricultural commercialisation corresponds to an increase in power over decision-making regarding farm resources and income. This increases women's capacity to engage more in economic activities which will transform their welfare in terms of cash and wellbeing (e.g. confidence and self-esteem).

Relatively older women were more likely to be empowered compared to relatively young ones, probably because older women are also more likely to be widows or divorced, and hence are de facto household heads. The majority of women who were categorised in higher levels of empowerment came from villages with electricity rather than villages without electricity. This is mainly due to the effect of rice commercialisation in terms of the opportunities brought about by rice

commercialisation. Empowered women are more likely to engage in rice commercialisation activities.

The level of women's empowerment had a positive linear relationship with an increase in rice commercialisation. The majority of empowered women were therefore categorised in the higher commercialisation quintiles of the rice commercialisation index. Women from villages involved in different aspects of SRI were more empowered than those from the MSF and SSF groups, which imply that the different practices of SRI, including training on better agronomic practices, farm management, and group activities, had an empowerment outcome.

In view of these findings, economic and livelihood enhancements can contribute towards women's empowerment. Therefore, initiatives by government and non-governmental organisations that focus on rice commercialisation should be undertaken with a gender lens to narrow gender gaps among male and female farmers as well as male and female members within households.

Rice commercialisation is an important and effective approach to tackle hunger in rural farming systems and to reduce poverty since it can increase crop yield, raise incomes, and therefore improve nutrition outcomes among family members. The initiative to empower women through rice commercialisation should also focus on improving access for women and other vulnerable poor people to casual labour and alternative income-generating activities associated with rice processing and marketing. This would thereby contribute considerably to improving their empowerment and hence their food security and nutrition.

Since many women are still at the low- and medium-scale empowerment levels of transformation to full agricultural commercialisation, they will continue to benefit from ongoing rice commercialisation processes. The aggregate effects will eventually lead to economic growth as each household and individuals within households opt for different commercialisation pathways to get out of poverty. In this regard, the government of Tanzania and NGOs should focus on interventions that improve rice commercialisation including connecting villages to electricity, the improvement of feeder roads, and promoting gender dialogue within communities to foster the transformation of cultural and social barriers which impact negatively on women's empowerment.

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Appendix 1 Variable used in estimation of women's empowerment

Variable	Description	Expected sign
Age difference between head and woman	Years	-/+
Education of a woman	Years of schooling	+
Rice commercialisation index	Percentage of quantity of rice marketed out of harvested quantity	+
Household size (family size)	Number of household members living and eating on the same port	-/+
Woman total non-farm income	Monetary value in Tanzanian shillings	+
Head total non-farm income	Monetary value in Tanzanian shillings	-
Land size	Hectare	-/+
Multidimension poverty status (MPI)	1 = poor, 0 = not poor	-
Distance from tarred road/milling machine	Kilometres	-
Electrification status of a village	1 = Lives in a village with electricity 0 = Lives in a village with no electricity	+
Female headship	1 = A household is under headship of a female 0 = A household is under headship of a male	+

Source: Authors' own.

Appendix 2 Variable used for constructing the Women's Empowerment Index

Variable	Description
Care work	Whether a woman has adequacy in care work: 1= receives help to perform unpaid care work; 0 = does not receive help to perform unpaid care work
Decision-making on household income	Whether a woman has adequacy in having input on the use of household income: 1 = has adequacy; 0 = does not have adequacy
Decision-making on agricultural plot	Whether a woman in a household make decisions on agricultural plots with regard to what crop to plant, what input to use: 1= has adequacy; 0 = has no adequacy
Dietary diversity	A woman is empowered in nutrition if she has eaten at least five food groups out of twenty selected food groups: 1= meets dietary diversity; 0 = does not meet dietary diversity
Food security	A woman is empowered in food security if she lives in a household which is food-secure: 1 = food-secure household; 0 = food-insecure household
Engagement in collective action	A woman is considered empowered if in the household she lives there is at least one member who is involved in collective activities (in this study if a household has any SRI member)

Source: Authors' own.

ENDNOTES

1 The countries implementing APRA include Tanzania, Ethiopia, Malawi, Zimbabwe, Nigeria, and Ghana.

2 The detailed methodology is presented in another APRA working paper from Tanzania titled *Does Rice Commercialisation Impact on Livelihood? Experience from Mngeta in Kilombero District, Tanzania* (Isinika *et al.* 2020).

3 The MPI is constructed by using three dimensions which have ten indicators of poverty. The dimensions include health, education, and living standards. Nutrition and child mortality constitute the health dimension, child school attendance and years of schooling indicators together constitute the education dimension, while cooking fuel, sanitation, water, house floor, assets, and electricity constitute the living standard dimension. The indicators of health and education each have a weight of 1/6, while those of living standard have 1/8 each in contributing to poverty. The weight was given on a household which was considered to be deprived in a particular indicator. A household is considered to be MPI poor if they have a sum of weighted deprivation score of 1/3 of all weighted indicators.

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