Tropentag 2020, virtual conference
September 9-11, 2020

Conference on International Research on Food Security, Natural Resource Management and Rural Development
organised by ATSAF e.V., Germany

Effect of Land Degradation on Farmers' Food Security and Poverty Status Nexus Livelihood Diversification in Nigeria

Yusuf Oladimeji, Adunni Sanni, Abdullahi Hassan, Abubakar Sani

Ahmadu Bello University, Dept. of Agricultural Economics, Nigeria

Abstract

The extent of degraded and impoverished lands suitable for agriculture production in Nigeria is highly uncertain and cannot be established without due consideration of current land use. The objective of this study was to assess the effect of land degradation on smallholder farmers' food security and poverty status nexus livelihood diversification in Kwara State, north central, Nigeria. Primary data with the aid of structured questionnaire was employed to collect the relevant data. A multistage random farming household survey resulted in four Local Government Areas, eight villages, 240 farmers which were filtered to 92 and 148 land graded farmers (LDF) and non-degraded farmers (NDF) respectively. Descriptive statistics, perception index, food security and poverty indices, dichotomous regression models were used to achieve the aims of the study. The result indicates that 81.25% of the respondents identified erosion as the causes of land degradation with perception index of 4.3. Only 14.13% of LDF were food secured while about 42.57% of NDF were food secured. The poverty status revealed that only 9.78% of LDF fall under the threshold of 0.00–20.00, implying non-poor while 41.22% of NDF fall under this threshold. The results showed that the factors that affected food security and poverty status of LDF had variation from those that affected NDF and where it is the same, not by the same magnitude and direction. The average livelihood security composite index of LDF and NDF were 0.33 and 0.72 respectively implying that NDF had a low diversification as value of one means no diversification. The factors influencing livelihood diversification to off- and non-farm activities by LDF and NDF also differs in magnitudes, coefficients and directions. The results revealed that intercropping and mixed cropping are the most common strategy adopted by farmers in mitigating land degradation as 162 respondents acceded to it.

Keywords: Food security, land degraded farmers (LDF), mitigating strategies, Nigeria, poverty depth

*Corresponding author Email: yusuf.dimeji@yahoo.com ; +234803222000

Introduction

The UN convention to combat desertification (CCD), of which Nigeria is a cosigner, recognizes land degradation as a global development and environment issue. Land degradation is defined as a long-term loss of ecosystem function and productivity caused by disturbances such as direct or indirect human-induced processes. It is expressed as long-term process which occurs slowly and cumulatively and has long lasting impacts on rural people who become increasing vulnerable. Of recent, the total global area of degraded lands has been estimated at 10 - 60 million km^2 or about two billion ha (FAO, 2018). According to Abdelfattah, (2009), the world is losing 10 ha of arable land each minute - 5 ha to soil erosion, 3 ha from salinity, and 2 ha by other degradation processes. The links between poverty and degraded land or the environment interconnected with

rural livelihood diversification are influenced by the interaction of socio-economic, demographic and climatic factors. In Nigeria, land tenure systems and limited access to physical assets restricts farmers' ability to engage in improved land use practices which could enhance the productivity of farmers and minimize land degradation. In other words, these factors act as an impediment for environmental conservation and often result in a fundamental process of cumulative causation of poverty, land degradation and under development and results to livelihood diversification from on-farm to off- and non-farm activities. The objective of this study was to assess the effect of land degradation on smallholder farmers' food security and poverty status nexus livelihood diversification in north central, Nigeria.

Methodology

Nigeria lies between Longitudes 2° 49' E and 14° 37' E and Latitudes 4° 16' N and 13° 52' north of the equator with tropical climate, a total land area of 923,768.6 km^2 and the latest United Nations estimate of 2020 at a growth rate of 2.48% put the country's population at about 200 million with an average human density of 220 person km^{-2} (Oladimeji et al., 2019). Structured questionnaire with the help of trained enumerators was employed to collect the relevant primary data. A multistage random farming household survey resulted into 240 farmers which were filtered to 92 and 148 land graded farmers (LDF) and non-degraded farmers (NDF) respectively. Descriptive statistics, perception index, food security and poverty multidimensional indices, dichotomous regression models were used to achieve the aims of the study.

Result and Discussion

Knowledge and Perception of Land Degradation

The results in Table 1 revealed that erosion was perceived as the most important indicators of land degradation with frequency percentage of 86.97% and perception index of 4.2. Other physical indicators perceived by farmers in other of severity are set out in the table.

Table 1: Farmers' knowledge and perception of land degradation (n=330)

Degraded indicators	F*	%	Perception index	Degraded remarks
Erosion	287	86.97	4.19	Extremely
Nutrient deficiency	229	69.39	3.67	Severely
Soil colour changes	207	62.73	2.43	Moderately
Water logging	173	52.42	2.28	Moderately
Loss of vegetation	102	30.91	1.95	Slightly degraded
Others	69	20.91	1.06	Not /slightly
Total / average	1067	-	2.60	-

Note* = Multiple responses allowed

Food Security and Poverty Status of Rural Farm Households

The food security level and cost implications of LDF and NDF farmers are presented in Table 2. Thus, based on the level of food security, only (17) 11.97% of LDF were food secured while about 40% of NDF were food secured. Although, these category of farmers show zero or minimal evidence of food insecurity, it is evidence from the result that NDF are better food secured or less food insecure compared LDF as spell out in the Table 2. The calorie intake shortfalls are estimated based on the nutritional threshold level of 2260 Kcals/day/adult according to FAO with cost implication of 2.16 United State Dollar ($) /day/adult equivalent.

The poverty status among the sampled farmers was analyzed using global multidimensional poverty index as presented in Table 3. The t-statistics of farmers' income or expenditure indicated that there was statistically significant difference between both income and expenditure incurred between the two categories of farmers. It can be inferred that poverty was more

prevalent and severe among farmers whose land was degraded compared non-degraded farmers. The Cumulative Distribution Function (CDF) in figure 1 depicts that LDF stochastically dominated the CDF of NDF, that is, the LDF will always be poorer than the counterparts within the range of the specified poverty line. This shows that the land degraded farmers will always be poorer than the counterparts within the range of the specified poverty line. This implies that the head count ratio was robust to all possible choices of poverty lines within the specified range.

Table 2: Food security status and cost implications of land degraded and non-degraded farmers

Food security status	Calorie consumption / farmer / day Kcals	Average cost implication of Kcal (₦)	USD, ($)	Degraded land farmers F	%	Non-degraded land farmers F	%
Food secure*	Above 2260	796.35	2.158	17	11.97	75	39.89
Marginally fi	Between 1800 & 2260	729.05	1.976	25	17.61	59	31.38
Moderately fi	Between 1500 & 1800	539.63	1.462	33	23.24	30	15.96
Severely fi	Below 1500	469.92	1.273	67	47.18	24	12.77
Total				142	100	188	100

Source: *Field Survey, 2019, Note: fi denote food insecure, * FAO recommended, ₦ denote Nigeria currency and USD denote United State Dollar ($) Naira equivalent*

Table 3: Global multidimensional poverty index of land degraded and non-degraded farmers

Poverty status Parameters	Weighted score [aa] %	Land degraded F	%	Non-degraded F	%
Non-vulnerable (non-poor)	0.0 - 20.00	10	7.04	87	46.28
Vulnerable to poverty	20.1 - 33.33	26	18.31	38	20.21
Multidimensional poor (MPI)	33.34 – 49.99	41	28.87	22	11.70
Poverty severity	≥ 50.00	65	45.77	41	21.81
No of observation (n)	330	142	100	188	100
t-statistic by farm income	6.87***				
t-test by expenditure (₦)	3.21***				

Source: *Field Survey, 2019, Note: ** * denote statistically significant at 1%, [aa] adopted the categorization from World Bank (2010) Report*

Determinants of Food Security and Poverty Status of Farmers

The Logit model was used in estimating factors that influence food security and poverty status of land degraded farmers in the study area. The estimated coefficients of the Logit model, along with the standard error, t-values and marginal effect are presented in Table 5. The log likelihood function was -99.005, LR Chi^2 (11) equal 321.08 and prob. > chi^2 was 0.000 which indicates a good fit of the model. The results showed the estimates of the effect of land degradation on food security and poverty status of the affected farmers only. The factors that affect food security status of land degraded farmers had variation from that affecting poverty status and where it does, not by the same magnitude and direction. In food security, the odd ratio otherwise known as coefficients of grazing intensity (1.311), level of tree cut (0.775), frequency of flooding (4.502), farming experience (0.503), farm income (14.006) and dependency ratio (-3.009) were found significantly influence food security status of farmers.

Similarly, the results with respect to poverty status revealed that the odd ratio or coefficients of grazing intensity (2.009), conservation practices (-0.657), frequency of flooding (-0.690), level of education (-1.008), and farm income (-2.532) were found significantly influence poverty status of the farmers. It suffices to note that the positive coefficients on significant variables of food security imply that as the coefficients of these variables increase, the food security

decreases and vice versa. Conversely, the positive coefficients on some poverty variables imply that as these increases, poverty status increases.

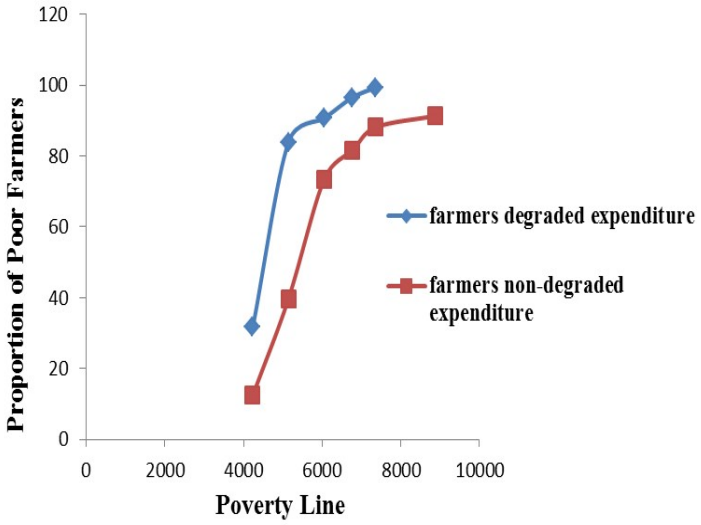

Figure 1: CDF by LDF and NDF farmers' expenditure

Figure 2: Land Degraded area in the study area

Livelihood Security of Land degraded and Non-degraded Farmers

The determinants of livelihood diversification to off- and non-farm among LDF include negative coefficients of remittance and gifts (0.087), level of degradation (-0.007) and household size (-0.407) implying that these variables will increase land degradation. A negative coefficient on level of degradation means low level of output and tendency to diversify outside agriculture. Furthermore, coefficients of variables such as education (0.349), farm size (0.107) and household size (0.324) were the factors statistically significant and all have positive influence in determining income diversification towards agricultural activities among non-degrade farmers.

CONCLUSION AND RECOMMENDATIONS

This research showed that the LDF are susceptible to higher poverty status, more vulnerable to food insecurity and higher livelihood diversification outside agriculture. The distribution of strategies adopted by the farmers in mitigating land degradation were ranked using mean index and these include inter / mixed cropping / crop rotation , plant tree / grass at edge, organic manure, cover cropping, tillage practices, waterways, contour , mulching, land fallowing and climate change forecast

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