



## **IMPACT OF WEST AFRICAN SOY LIMITED (WASIL) ON MAIZE FARMERS FOOD SECURITY IN NORTH-WEST, NIGERIA**

**\*Ebenehi, O., Muntakka, M. and Fawole, B. E.**

\*Department of Agricultural Extension and Rural Development, Federal University,  
Dutsin-Ma, P.M.B 5001, Dutsin-Ma, Nigeria

**Correspondin Author's Email:** ebenehi.o@gmail.com, **GSM:** +234-806-374-5147

### **ABSTRACT**

In Nigeria, farmers depend largely on supports for farm inputs which can be in the form of subsidies in order to improve their livelihoods. These supports are usually made available and accessible to them by government and non-governmental organizations. In this article, the impact of West African Soy Limited Maize Farmers Intervention Scheme was investigated. The study employed Propensity Score Matching to net out the average treatment effect on treated which is the impact of the programme on the beneficiaries using food security as an outcome indicator. Two hundred and eighty-two (282) households head who benefitted from the programme were purposively and proportionately selected while another Two hundred and eighty-two (282) non-beneficiary's household heads were randomly selected and used as control group. The result revealed that the programme had a positive and significant influence at 5% level of confidence on their food security status and the average treatment effect on treated (ATT) was 0.2037 (20%). The size of the estimated treatment effect suggests an improvement in the livelihood of the beneficiaries compared to the non-beneficiaries. The programme, though a private sector initiative is such that has potential of ensuring increased income as well as food security of the poor resource small scale farmers in the rural areas of North West, Nigeria. The study therefore recommends that female household head need to be encouraged to key into the programme in order to improve their income base. In addition, there is need for increased and rigorous capacity building of the farmers by extension agents of the programme in order to sustain the gains.

**Keywords:** Treatment Effect, Farming households, Food security, WASIL

### **INTRODUCTION**

Despite the discovery of crude oil and the rapid development in the industrial sector in recent years, Nigeria's economy is still greatly influenced by agriculture (FAO 2019). This is evident in the fact that some Nigeria communities are mostly rural and agrarian by occupation as over 70% of the 150 million people in these rural areas are engaged in agricultural production Iheanacho and Ozegbe (2020). However, the Nigerian agriculture is still at subsistence level. There is the need to increase research and development efforts as well as extension outreach. Sasakawa Global (SG) 2000, Agricultural Research Council of Nigeria 2007, and Agricultural Transformation Agenda 2011, the Fadama I, II, III and the Fadama Additional Finance, Anchor Borrowers scheme, Agricultural Transformation Agenda and Commercial Agricultural Development Project. Government and Non-governmental organization have taken several steps over the years to use agriculture as a vehicle to alleviate poverty and attain food security, yet there is low and declining production of Nigeria agricultural sector due to poorly developed irrigation facilities, non-access to funds, inadequate infrastructure, ineffective agricultural research and extension systems, non-availability and poor distribution of key inputs like fertilizers, chemicals, machinery and improved seeds (Nwaobiala and Ubeh, 2019). Supporting



this view, the Nigeria Foreign Direct Investment (2020) argued that the various attempts by Nigerian government in initiating agricultural development projects aimed at achieving food security have failed to yield the desired objective. These government projects and interventions are essential for agricultural development in Nigeria, as Egbunike *et al.* (2018) asserted that such government projects are considered not only as key determinant for driving economic transformation but also as a critical element for fostering innovation and competitiveness. Iheanacho and Ozegbe (2020) posited that several issues are associated with such government projects and their implementation. These include poor project funding, low level of local government support, poor community support, capacity building. It is worthy of note at this point that apart from the above-mentioned national efforts, Nigeria has had and is still having other livelihood enhancement programmes being powered by several Non-Governmental Organizations (NGOs). An example of such NGO is the West African Cotton Limited (WACOT) through its subsidiary, the West Africa Soy Limited (WASIL).

The emphasis being placed on agriculture and rural development by Non-Governmental Organizations (NGOs) among which is WASIL, justifies the need for an empirical study on the performance of WASIL in North-Western Nigeria. To the best of the knowledge of the researcher no work has been conducted on WASIL in the North-western Nigeria, hence this research work is a pioneering attempt at assessing the impact of WASIL Programme on the livelihood of its beneficiaries in the North Western Nigeria. This simply means that there is dearth of literature and data on the impact of WASIL activity in the North West region of Nigeria. Reports from Nigeria multi-dimensional poverty index (MPI)(2022) revealed that the North western states of Nigeria are the poorest with over 80% of its population within the multidimensionally poor cycle (MPPN, 2019), while WASIL has been in operation and has been carrying out its poverty alleviation, food security and livelihood enhancement activities through provision of inputs such as chemicals, seeds, fertilizer and advisory services, credit facilitation, and market linkages in the North-West region of Nigeria for the past 7 years. This reality provides the justification for WASIL intervention programme. However, poverty still remains a common sight in the North-Western part of the country. Nwaobiala and Ubeh (2019) all studied the impact of intervention programmes on the livelihood of beneficiaries and how it relates to poverty reduction. It is an improvement on the study of intervention programmes because most research works in the past have utilized either the quantitative or the qualitative analytical technique Umar, (2019) assessed the impact of intervention programmes on the livelihood of beneficiaries using qualitative techniques while Olanrewaju *et al.* (2020), studied the impact Anchor Borrowers Scheme and found that it made impact on the beneficiary's livelihood, income and food security, but in netting out the income they did not specify the type either on-farm or off-farm income. Thecla (2020) also studied household food security and its determinants in agrarian communities of South Eastern Nigeria, the income the researcher relied on to generate the income to be used in netting out the food security index which they will in turn use to categorize the households into food secure and food insecure but did not specify the source, that is the income used was not tied to any particular crop or enterprise. Thus, this study seeks to analyse the impact of WASIL on the livelihoods of maize farmers in North-Western Nigeria with the following research objectives:

- i. describe the socio-economic characteristics of programme beneficiaries and non-beneficiaries in the study area.
- ii. assess the impact of WASIL maize intervention programme on food security of the beneficiaries in the study area.



## MATERIALS AND METHODS

### Sampling Procedure and Sample Size

The study was carried out in the North Western Nigeria, which consist of seven (7) States (Katsina, Kaduna, Kano, Jigawa, Kebbi, Zamfara, and Sokoto) out of which (3) States (Kaduna, Katsina and Jigawa) were purposively selected for this study because of the specificity of WASIL on maize production in the states. A Multi-stage sampling technique was used to select the sample for the study which involves the following stages: Stage I: involves a purposive selection of Kaduna, Katsina and Jigawa States because WASIL programmes in these selected states is specific on maize production; Stage II: involves a purposive selection of two (2) LGAs from each State. In this regard, Zaria and Giwa in Kaduna State, Malumfashi and Kafur in Katsina State, and Gagarawa and Gumel LGAs Jigawa State. The reason for the selection of the LGAs in these states was based on the concentration of maize farmers in them when compared with other LGAs in the states. Stage III: From a list of WASIL register made available, there were 1,052 maize farmers in the selected LGAs out of which 282 maize farmers were proportionately selected with RAOSOFT sample size calculator using 5% of the population at 5% level of significance. Stage IV: A list of 2710 registered maize farmers who were not on WASIL list of farmers was obtained from ADPs of the three states out of which 282 was randomly and proportionately selected as control group.

Primary data source was employed to elicit first-hand information from the respondents in the study area. Interview schedule, as well as structured questionnaire were used to generate data needed to achieve the broad and specific objectives. Descriptive statistics such as mean, frequencies and percentages and tables were used to achieve objectives (i) which was used to describe the socio-economic characteristics of maize farmers in the study area and Propensity score matching (PSM) which refers to the pairing of treatment and control units with similar values on the propensity score, and possibly other covariates, and the discarding of all unmatched units (Rubin, 2001).

## RESULT AND DISCUSSION

### Socioeconomic characteristics of Beneficiaries and Non-beneficiaries of WASIL Maize Intervention Programme

**Age of the Respondents:** The distribution of respondents by age is presented in Table 1 for that both the beneficiaries and non-beneficiaries household head. The mean age of 44 years and 40 years has a marginal difference. This result is consistent with the findings of Afolami *et al.* (2012) who obtained 46 and 48 years as mean age of rice farmers in Ekiti and Ogun States respectively. Ogundele and Okoruwa (2006) found that the estimated average age of rice farmers under traditional technology was 42 years while 45 years was obtained among rice farmers under improved technology. They asserted that farmers within the productive age of 20-45 years are likely to have the necessary physical stamina required to carry out farm operations. **Sex of the Respondents:** The pooled result shows that there are more male maize farmers among the beneficiaries when compared with their female counterpart (95.4%) and (70.9%) respectively. The implication of these result is that apart from the culture which restricts women and allow men to explore productive avenues such as WASIL, men were the head and bread winner in most homes and due to the demands of running the home/family they will have to take any form of risk not limited to participation in any intervention programme such as WASIL so as to increase their productive capacity as well as more income which can further translate into improved standard of living.



The findings, is in agreement with Nlerum (2012) who noted that yam production in Rivers State, Nigeria was dominated by males and it could be attributed to the energy demanding activities involved in yam production which require men who are naturally endowed with abundant strength necessary for the job. **Marital Status:** Pooled results show that (83%) of the respondents were married among beneficiaries as compared to (77%) among non-beneficiaries. Respondents that were single by marital status constituted (9.6%) and (20.9%) among beneficiaries and non-beneficiaries of WMIP respectively. Farmers who are married are likely to have family labour force that can contribute to farm labour especially when the agricultural intervention programme is labour intensive as its always the case with agricultural driven programmes. Mani *et al.* (2022) reported that large percentage of married respondents among maize farmers is an indication that more members will likely be available for crop production. **Household Size:** The pooled results also show that beneficiaries have a mean household-size of 9 while the non-beneficiaries have a mean household-size of 7. The household-size maybe related to the number of household members that will be available for farm work. There is a probability that the larger the household-size the greater the volume of farm work that will be absorbed by household labour. This socio-economic variable is expected to influence the participation in programmes that are beneficial and has considerable labour requirement. Olanrewaju *et al.* (2020) asserts that household-size is an important index in rural development intervention which can affect the outcome of such intervention. **Farming Experience:** Results from Table 1 shows that Mean years of experience in maize farming among beneficiaries of WMIP was slightly lower (12 years) than that of non-beneficiaries (13 years) in the pooled result. Conversely the mean years of experience in maize farming among beneficiaries in Kaduna State (20 years) was higher than that of non-beneficiaries (13years). In Katsina State, mean years of experience in maize production among beneficiaries (11years) was slightly lower than that of the beneficiaries 12years. In Jigawa, State the mean years of experience among beneficiaries 10 years was lower than that of the non-beneficiaries which is 16 years. Farming experience can have both negative and positive influence on programme participation. With more experience, maize farmers can be cautious and unwilling to take risk with less experience they might be eager and anxious to embrace any intervention programme that promises to improve their living standard.



**Table 1:** Socio-Economic Characteristics of Beneficiaries and Non-beneficiaries of WASIL Maize Intervention Programme in Kaduna, Katsina and Jigawa States

	Kaduna		Katsina		Jigawa		Pooled	
	N.B	B	N.B	B	N.B	B	N.B	B
<b>Age</b>								
10-19	0	1(0.5)	0	0	0	0	0	1(0.4)
20-29	0	44(21.2)	12(5.4)	8(17.0)	3(7.3)	0	15(5.3)	52(18.4)
30-39	4(22.2)	50(24.0)	64(28.1)	15(31.9)	12(29.3)	4(14.8)	80(28.4)	69(24.5)
40-49	8(44.4)	66(31.7)	65(29.2)	9(19.1)	10(24.4)	11(40.7)	83(29.4)	86(30.5)
50-59	6(33.3)	36(17.3)	56(25.1)	8(17.0)	12(29.2)	10(37.0)	74(26.2)	54(19.1)
60-69	0	10(4.8)	26(11.6)	4(8.5)	4(9.8)	2(7.4)	30(10.6)	16(5.7)
70-79	0	1(0.5)	0	3(6.4)	0	0	0	4(1.4)
<b>X</b>	<b>45</b>	<b>39</b>	<b>44</b>	<b>42</b>	<b>43</b>	<b>46</b>	<b>44</b>	<b>40</b>
<b>Sex</b>								
Male	18(100)	197(94.7)	155(69.5)	45(95.7)	21(51.2)	27(100)	200(70.9)	269(95.4)
Female	0	11(5.3)	68(30.5)	2(4.3)	20(48.8)	0	82(29.1)	13(4.6)
<b>Marital Status</b>								
Married	18(100)	152(73.1)	184(82.5)	38(80.9)	32(78)	27(100)	234(83)	217(77)
Single	0	51(24.5)	23(10.3)	8(17.0)	4(9.8)	0	27(9.6)	59(20.9)
Divorce	0	3(1.4)	8(3.6)	0(0)	3(7.3)	0	11(3.9)	3(1.1)
Widow	0	2(1.0)	5(2.2)	1(2.1)	1(2.4)	0	6(2.1)	3(1.1)
Widower	0	0	3(1.3)	0(0)	1(2.4)	0	4(1.4)	0
<b>X</b>							<b>X=1.3</b>	<b>X=1</b>
<b>House Hold Size</b>								
0-9	8(44.4)	158(76)	134(60.1)	35(74.5)	34(82.9)	14(51.9)	176(62.4)	207(73.4)
10-19	7(38.9)	42(20.2)	88(39.5)	10(21.3)	7(17.1)	10(37)	102(36.2)	62(21.9)
20-29	2(11.1)	7(3.4)	1(0.4)	2(4.2)	0	3(11.1)	3(1.1)	11(3.9)
30-39	1(5.6)	1(0.4)	0	0	0	0	1(0.3)	2(0.7)
<b>X</b>	<b>12</b>	<b>6</b>	<b>9</b>	<b>8</b>	<b>6</b>	<b>11</b>	<b>9</b>	<b>7</b>
<b>Farming Experience</b>								
0-9	1(56)	88(42.3)	82(36.8)	0	15(36.6)	7(25.9)	98(34.8)	95(33.7)
10-19	6(33.3)	58(27.9)	123(55.2)	0	25(61.0)	11(40.7)	154(54.6)	69(24.5)
20-29	6(33.3)	35(10.8)	15(6.7)	8(17.0)	1(2.4)	3(11.1)	22(7.8)	46(16.3)
30-39	4(22.2)	22(10.6)	2(0.9)	15(31.9)	0	5(18.5)	6(2.1)	42(14.9)
40-49	1(5.6)	5(2.4)	1(0.4)	9(19.1)	0	1(3.7)	2(0.7)	15(5.3)
50-59	0	0	0	8(17.0)	0	0	0	8(2.8)
60-69	0	0	0	4(8.5)	0	0	0	4(1.4)
70-79	0	0	0	3(6.4)	0	0	0	3(1.1)
<b>X</b>	<b>20</b>	<b>13</b>	<b>11</b>	<b>12</b>	<b>10</b>	<b>16</b>	<b>12</b>	<b>13</b>
<b>Total</b>	<b>18(100)</b>	<b>208(100)</b>	<b>223(100)</b>	<b>47(100)</b>	<b>41(100)</b>	<b>27(100)</b>	<b>282(100)</b>	<b>282(100)</b>

Source: Authors' Analysis, 2022

KEY: N.B = Non- beneficiary, B = Beneficiary, X = Mean

### Propensity Score Balancing Test

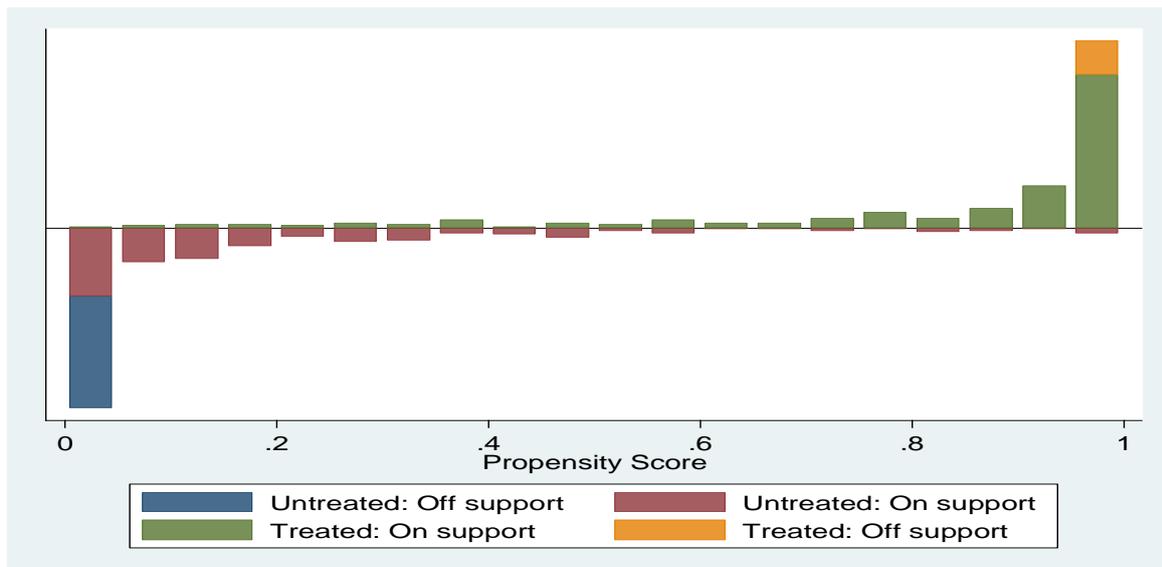
The probability of participation in the WASIL programme is predicted by the propensity score and this was estimated from a logistic regression of WASIL participation status on the predictor variables. The probability for all households was 0.5959 which means that a particular household selected at random to participate in the scheme is 59% with respect to the outcome variable. The common support graph was drawn to test the balancing as well as the quality of match. The region of common support was found to be between 0.02 – 0.999. From the graph on figure 3 a considerable overlap of propensity scores exists between the Beneficiaries and Non-beneficiaries which means that the match is good and the balancing property is satisfied. On the strength of this result, the PSM technique can be deployed to attribute an increase in maize income and maize production to participation in the WASIL programme. This is because any selection bias due to observed covariates have been eliminated and accounted for.

### Estimation of Average Treatment Effect

To assess the causal effect of WASIL extension programme on household income and food security two outcome variables were employed; i.e., household income and household food security. Accordingly, the ATT, ATU and ATE were estimated to justify the outcome of the analysis. The subsequent sections present the impact of the programme on the outcome variables of interest-household income and food security.

### Common Support Region

The study imposes the common support condition in the estimation in the analysis by matching in the region of common support. Based on this condition, the result in Figure 1 shows the distribution of propensity scores for the treated and untreated group and the region of common support. The bottom half of the figure shows the propensity scores distribution for the untreated group, while the upper-half refers to the treated individuals. The densities of the scores are on the y axis. It is very clear, from the observation of this figure, that the common support condition is satisfied as there is overlap in the distribution of the propensity scores of both the treated and the untreated groups



**Figure 1: Common Support Graph**

Source: Authors' Analysis 2022



### **Impact of WASIL Extension Programme on Household Food Security Status of Beneficiaries and Non-beneficiaries**

The result in Table 2 presents the impact of WASIL programme on food security. The result revealed that participation in WASIL programme had positive and significant influence at 5 % level of confidence on the food security status of smallholder farmers, the average treatment effect on treated (ATT) was 0.2037. This implies that about 0.20 or 20 % increase in food security of participating households. The result further shows ATU of about 0.14 or 14 % for non-participants, this also implies 14 % increase in food security of non-beneficiaries had it been they participated in the programme. Increase in food security status may be because participating farmers obtained higher yield and premium price of maize, which enables them to have more income to cater for household food expenditure than the non-beneficiaries' maize farmers. The result is consistency with findings of Obisesan and Akinola (2021) and Siewe *et al.* (2021).

**Table 2:** Impact of WASIL Extension Participation on Food Security Status

Outcome	Sample	Treated	Control	Difference	SE	t-test
Food Security	Unmatched	0.3873	0.2672	0.1200	0.0432	2.77***
	ATT	0.8762	0.6725	0.2037	0.0985	2.40**
	ATU	0.6625	0.5254	0.1371		
	ATE			0.0665		

**Note:** SE= standard error, \*\*  $p > 0.05$  and \*\*\*  $p > 0.01$

Source: Field Survey, 2022

### **CONCLUSION AND RECOMMENDATION**

The WASIL maize intervention Programme has impacted positively on the livelihood of its intended beneficiaries in the North Western region of Nigeria in terms of achieving its set out objectives of ensuring food security among small scale maize farmers. The programme has great potential, which if properly managed and sustained could serve as the spring board for future private agricultural development initiatives. Based on the findings that there are more male beneficiaries in the programme,

1. female household need to be encouraged to key into the programme in order to improve their food security status.
2. WASIL should expand the number of benefitting states so as to accommodate more beneficiaries as it was found to have made significant impact on the food security status of beneficiaries to the tune of about 20% as revealed by the findings of these research work.
3. Although extension contact was significant, it should be sustained and if possible improved upon as the gains of the programme can only be sustained through that.

### **REFERENCES**

Afolami C.A., Agbonlahor M.U., Adebowale O.A., Abiodun.O. (2012). Socio-economic analysis of Rice Farmers and Effects of Group Formation on Rice Production in Ekiti and Ogun States of South-West Nigeria. *Journal of Agricultural Science* 4(4): 1-12.

Egbunike F.C., Emadaimowo. O.B., and Gunardi, A. (2018). Tax revenue and economic growth: A case study of Nigeria and Ghana. *Sigfikan Journal Limu Economy*, 7(2): 213-220.



- FAO (2019). *The role of agriculture and rural development in achieving Sustainable Development Goal 1:1*. Paper presentation at the United Nations expert group meeting on eradicating Rural Poverty to implement the 2030 Agenda for sustainable development. UNECAC-AA. 1-167.
- Foreign Direct Investment (FDI) (2020). Impact of selected agricultural policies and intervention programmes in Nigeria- 1960-till date. *Rglobal*. 1-20.
- Iheanacho, N., O. and Azuka, E. (2020). An Assessment of Foreign Direct Investment and Sustainable Development nexus: The Nigeria Ghanaian perspectives. *International Journal of Management, and Social Sciences (IJMESS)*.**10**(1): 49-67.
- Mani, J.R., Issah, F.O., Abdulssalam, Z., and Damisa, M.A. (2022). Factors influencing farmer participation in maize production in Kaduna State, Nigeria. *Journal of agriculture and environment* **18**(1): 1-11.
- Multidimensional Poverty Peer Network (MPPN) (2019). *Nigeria Multidimensional Poverty Index*. <https://www.mppn.org/nigeria-national-mpi>.
- Nlerum, F.E., Albert, C.O., and Prince-Kaye, E.S (2012). Access of Rural Women to Agricultural Information I Eleme area of Rivers State, Nigeria. *Journal of Agricultural and Food Information*, **13**(2): 1-16.
- Nwaobiala, C. U and Ubeh, C. (2019). Effect of the Third National Fadama additional financing project on the output and poverty levels of rice farmers in Enugu state. Nigeria. *Nigerian Journal of Rural Sociology*, **19**(1): 72-86.
- Obisesan, N.O. and Akinola, E. (2021). *Influence of Information Technology on Internal Control System Research gate DOI 10:35631AIJBAF.37008* **3**(7): 92-103.
- Ogundele and Okoruwa (2006) Technical Efficiency Differentials in Rice Production Technologies African Economic Research Consortium 1-26.
- Olanrewaju, O., Osabohien, R., and Fasakin, J., (2020). The Anchor Borrowers Programme and Youth rice farmers in Northern Nigeria. *Journal of Agricultural Finance Review*. **2**: 1-7.
- Rubin (2010) as cited in Austin P.C (2011). An introduction to Propensity Score Methods for reducing the effects of confounding in observational studies multivariate. *Behave Resource*, **46**(3): 399-424.
- Siewe, F., Egwuma, H., Ojeleye, O. A., Oladimeji, Y. U., Ahmed, B. and Damisa, M. A. (2021). Does farmers participation in cassava processing reduce their poverty level? Evidence from Kaduna State, Nigeria. *Nigerian Journal of Rural Economy and Society*, **7**(1and 2): 1-10.
- Thecla I.A (2020). Household food security and its Determinants in Agrarian Communities of Southeastern. *Nigeria. Journal of Agro-Science*, **19**(1): 1-10.
- Umar, S. (2019). Factors influencing Adoption of improved rice production technology (IRPT) under the anchor borrowers programme (ABP) In Kebbi State, *Journal of agriculture and veterinary science*, **12**(7): 19-26.