

**The Impact of the Fadama II Intervention on Rural Households in Kogi and Kwara States,
Nigeria**

ABSTRACT

The Fadama Development project (FDP) an AfDB- financed project with counterpart funding contribution from the State and Local Governments. The project sector goal was to reduce poverty by improving the living condition of the rural poor, contribute to food security and increase access to rural infrastructure.

This study was undertaken with the objective of quantifying the impacts of the project on poverty reduction in respect of the project beneficiaries. To achieve these objectives, the study employed household level data collected from 240 respondents selected from all the 20 Local Government Areas (LGAs) that benefitted from the AfDB Assisted Fadama II project in Kogi and Kwara states of Nigeria.

These data were analyzed using descriptive statistics as well as propensity score matching (PSM). To determine the direct impact of the project, the PSM was used to select a group of households that participated in the project and comparison groups that did not participate in the project but had comparable socio-economic and biophysical characteristics as the selected project beneficiaries. To determine the direct impacts of the project, the households were stratified into two groups; Fadama II direct beneficiaries, and non-beneficiaries living in Fadama LGAs.

The study revealed that the majority of the respondents including the participants were males, mostly married, in their active age bracket and arable crop farmers. The main source of income was arable crop production which accounted for 57% (59%) in Kogi (Kwara) State among participants..

The results showed that average per capita daily intake for the beneficiaries was 2,608 (2,558) kilocalories per person per day in Kogi (Kwara), which was higher than the minimum of 2,250

kilocalories per person per day recommended for the country. However, the average per capita daily intake for non-beneficiaries was 1679 (2114) kilocalories per person per day in Kogi (Kwara) which was lower than the minimum per person daily recommendation.

The per capita daily protein intake was highest for the beneficiaries 39g (37.1g) for Kogi (Kwara) a figure higher than the 35g minimum per person per day recommended from animal material. The poverty line generated for Kogi (Kwara) based on the World Bank rule of thumb approach of two-thirds total consumption expenditure was ₦ 161(₦157), about \$1 USD. According to this poverty line, 30 (32) per cent of the beneficiaries were below the poverty line. However, the number of households below the poverty line was higher among the nonparticipants.

The results from PSM estimates on household income showed that in Kogi (Kwara) state, the participants earned extra average income of ₦2668.42 (₦9839.58) more than the non-participants. Similarly, the estimates on productive assets showed that the participants earned extra average productive assets of ₦523, 094.74 (₦598, 529.03) more than the non-participants. The results also indicate that participants had extra average livestock assets of ₦22, 884.97 (₦85, 987.93) more than the non-participants, implying that the intervention impacted positively on the poor by improving their income, productive assets, and livestock assets of the participants.

It could be concluded that AfDB financed Fadama II project improved the general livelihood of the participants in Kogi and Kwara States, Nigeria. The programme should therefore be sustained and expanded because of its positive and significant impact on the welfare of the participants through greater support from donor, local, state, and federal governments of Nigeria.

Keywords: AfDB, fadama II project, poverty, propensity score matching

1. INTRODUCTION

The Fadama Development project (FDP) is an AfDB- financed project with counterpart funding contribution from the State and Local Governments of Nigeria. The project was designed to be implemented in six years period (2005 – 2011), but received an extension and terminated in December, 2012. Fadama Development Project II financed with loan from the

57 African Development Bank covered the six states of Kogi, Katsina, Jigawa, Plateau, Kwara and
58 Borno [8].

59 The project sector goal was to reduce poverty by improving the living conditions of the rural
60 poor, contributing to food security and increasing access to rural infrastructure. Specifically, it
61 was designed to enhance agricultural production, productivity and value addition of smallholder
62 farmers and rural entrepreneurs in Fadama areas on a sustainable basis. It has 3 components
63 namely; Capacity Building and Advisory Services, Rural Infrastructure Investment as well as
64 Project Management and Coordination.

65 (a) The capacity building and advisory sub-component provides for advisory services in
66 response to the needs of Fadama resource Users. It also assists in establishing linkages
67 between Fadama users and input suppliers, market, training, learning events. It also
68 makes available other activities to promote the sharing of knowledge. The beneficiaries
69 are also required to contribute 10% under this component [9].

70 (b) Production input support sub-component

71 Production Support sub-component was created in the year 2009 in order to bridge the
72 gap occasioned by food shortage. The sub-component intervened through the provision of
73 such inputs like fertilizer, improved seeds, mechanical knapsack sprayers, pumping
74 machines, processing machines, etc. It was to provide subsidized inputs to farmers
75 thereby lessening the farmers, cost of production and ultimately affording them increased
76 output as well as income on a sustainable basis.

77 c) Rural Investment

78 This component was created with the aim of financing the construction or rehabilitation of
79 eligible small-scale infrastructure projects, specified as priorities in Community
80 Development Plans. Here, the beneficiaries are required to pay 10 percent of the cost of
81 proposed rural infrastructure, such as rural roads, culverts, market infrastructure, post-harvest
82 infrastructure, etc.

83 d) Project Management

This was put in place to ensure effective coordination of all project activities. This concerns the day-to-day running of the project activities. Subsumed under this component are: Monitoring and Evaluation Sub-component; Procurement Sub-component; Finance Sub-component; and Environmental Sub-component.

The Project was implemented in ten Local Government Areas (LGAs) in each state. In Kogi State, the participating LGAs are Adavi, Bassa, Ibaji, Idah, Kogi, Kabba-Bunu, Lokoja, Mopamuro, Olamaboro and Omala [5], while in Kwara State, the participating LGAs are Asa, Baruten, Edu, Ekiti, Ilorin-East, Irepodun, Isin, Moro, Oyun and Patigi [6].

Review of the project implementation status in Kogi state indicates almost 100% achievement in input support programme, 53% achievement in Fadama access road construction, 50% in Fadama access road rehabilitation, 100% achievement in boreholes, 62.4% achievement in open wells, while marginal achievement (25%) was recorded for tube wells in the state [5].

While in Kwara State, almost 100% achievement in input support programme, 80% achievement in the area of infrastructure sub-projects and an average achievement of 57.14% was recorded in the area of Capacity Building and Advisory Services. The project recorded 100% achievement in road construction, road rehabilitation, boreholes, and open wells, while marginal achievement (25%) was recorded for tube wells in the state [6].

This study aimed at quantifying the impacts of the intervention on the income, productive assets, livestock assets, and consumption of the participants in Kogi and Kwara States of Nigeria.

2. MATERIALS AND METHODS

2.1 The Study Area

The study was conducted in Kogi and Kwara States of Nigeria. Both states are found in the central region of Nigeria. Agriculture is the mainstay of the economy of both states and the principal cash crops in Kogi are notably coffee, cocoa, palm oil, cashews, groundnuts, maize, cassava, yam, rice and melon; while the principal cash crops in Kwara are cotton, cocoa, coffee,

111 Kolanut, tobacco, beniseed and palm produce. The majority of the people of the state are
112 farmers.

113 The topography is mainly a plain land with annual rainfall of between 1000mm and
114 1500mm and average temperature of between 30⁰C and 35⁰C. The climate is of two distinct
115 types, the wet season and dry season. The wet season is from April to October, while the dry
116 season is from November to March. It has intervals of cold and dry harmattan in the early part of
117 it and hot and low humidity in later part.

118 **2.2 The Sampling**

119 In analyzing the impact of the intervention on beneficiaries, we stratified the sampling frame into
120 two strata: (i) Fadama II project direct participants and (ii) respondent who live in Fadama II
121 project communities, but did not participate directly in the project but whose socio-economic and
122 biophysical characteristics are comparable to the Fadama II project beneficiaries in the same
123 LGA..

124 The advantage of this stratificationis that it enabled estimation of the direct effects of
125 Fadama II. By comparing outcomes for Fadama II direct beneficiaries with outcomes for similar
126 (in terms of initial assets endowments, education, etc.) non-participating households in the same
127 communities, we obtain an estimate of the direct impacts of the intervention.

128 A sample size of 480 households was used in this study with 240 from each state and
129 gender was given consideration in the overall sample selection. Sampling procedure covered the
130 ten participating LGAs in each state. The sample size comprises 120 Fadama II beneficiaries (10
131 per LGA), and 120 non-Fadama II households in Fadama II LGAs in each state.

132 **2.3 DataCollection**

133 A structured questionnaire was used for data collection. Recall method was used to
134 collect some data on major assets and major component of the household expenditure.
135 Household respondents had no difficulty recalling the required information because their
136 livelihood strategies have not changed significantly from what used to be.

2.4 Data Analysis

Data were analyzed using descriptive statistics consisting of means and frequency counts as well as propensity score matching (PSM) method. PSM was used to evaluate the impact of participation on household income, consumption, productive and livestock assets.

Calorie/protein consumption and food expenditure were also used as proxies for measuring food security. Consumption consists of household's produced and purchased food whether raw, boiled, roasted or fried. Daily food intake was calculated by converting household food consumed into calorie and protein equivalents following Oguntona and Akinyele, [10]. Based on the World Bank rule of thumb approach of two-thirds total consumption expenditure the poverty level was calculated.

2.5 Analytical Framework

A propensity score model controls for self-selection that normally arises when technology adoption is not randomly assigned and self-selection into adoption occurs. The main parameter of interest in non-experimental framework is the average treatment effect for the treated population (ATT), expressed as

$$\tau_{ATT} = E(Y_1 - Y_0 | D = 1) = E(Y_1 | D = 1) - E(Y_0 | D = 1),$$

where Y_1 denote the value of the outcome when the household is a participant, and Y_0 is the value of the same variable when the household does not participate. The problem that arises with unobservability is by virtue of the fact that $E(Y_1 | D = 1)$ can be estimated but not $E(Y_0 | D = 1)$. Although $\tau = E(Y_1 | D = 1) - E(Y_0 | D = 0)$ can normally be estimated, it is potentially a biased estimator of τ_{ATT} . This kind of bias is a central concern in non-experimental studies [13].

The propensity score matching (PSM) model has been suggested by Rosenbaum and Rubin [11, 12] to account for sample selection bias due to observable differences between treatment and comparison groups [2]. PSM controls for self-selection by creating the counterfactual for the group of participants. PSM constructs a statistical comparison group by matching every individual observation on participants with individual observations from the group of non-participants with similar characteristics. In effect, the matching procedure creates the conditions of a randomized experiment in order to evaluate a causal effect as in a controlled experiment [11]. To achieve this, the matching approach employs the conditional independence assumption (CIA), which states that technology selection is random and uncorrelated with the

167 outcome variables, once we control for Z .

168 The CIA or “strong unconfoundedness” can be given as

$$169 \quad Y_1, Y_0 \perp\!\!\!\perp D \mid Z$$

170 The effect of participation on the outcome variables can then be expressed as

$$171 \quad \tau_{ATT}(Z) = E(Y_1 - Y_0 \mid Z) \\ 172 \quad = E(Y_1 \mid D = 1, Z) - E(Y_0 \mid D = 0, Z).$$

173 The average participation effect can then be represented as

$$174 \quad \tau = E\{\tau(Z)\}.$$

175 Under the condition of random program participation, outcomes for similar households in
176 different status (i.e., participants vs. non-participants) can be compared, with similar households’
177 defined according to the values of Z . The propensity score reduces the dimensionality of the
178 conditioning problem associated with Z by comparing households with similar probabilities of
179 adopting the new technology, given the relevant controls Z [2]. The conditional probability to
180 adopt the new technology, given the control of Z , is as follows:

$$181 \quad p(Z) \equiv P(D = 1 \mid Z) = E(D \mid Z)$$

182 where $D = \{0, 1\}$ is the indicator of exposure to treatment, and Z is the multidimensional vector
183 of pre-treatment characteristics. As indicated above, the propensity score is a function such that
184 the conditional distribution of Z , given $p(Z)$, is the same in both groups, that is, conditional to p
185 (Z), Z and D are independent. This balancing property of propensity score can be expressed as
186 $D \perp\!\!\!\perp Z \mid p(Z)$.

187 Hence, if the unconfoundedness assumption holds, all biases due to observable
188 components can be removed by conditioning on the propensity score [4]. Given the propensity
189 score, which can be estimated by any standard probability model, the ATT can be estimated
190 under the CIA as follows [1]:

$$191 \quad \tau_{ATT} = E\{Y_1 - Y_0 \mid D = 1\} \\ 192 \quad = E\{E\{Y_1 - Y_0 \mid D = 1, p(Z)\}\} \\ 193 \quad = E\{E\{Y_1 \mid D = 1, p(Z)\} \\ 194 \quad - E\{Y_0 \mid D = 0, p(Z)\} \mid D = 1\}.$$

195 Another important requirement for conducting the matching method is the common
196 support condition (CSC). Heckman *et al.* [3] point out that it is only in the overlapping subset

of the comparison and treatment groups that comparable observations can be matched. The overlap condition is defined as follows:

$$0 < P(D = 1 | Z) < 1.$$

By the overlap condition, the propensity score is bounded away from 0 and 1, excluding the tails of the distribution of $p(Z)$. This assumption ensures that persons with the same Z values have a positive probability of being both participants and non-participants. If there are regions where the support of Z does not overlap for the different groups, matching is only justified when performed over the common support region. A violation of the CSC is a major source of bias due to comparing incomparable individuals [3]. Individuals that fall outside the region of common support have to be discarded and so the treatment effect cannot be estimated. After estimating the propensity scores, the next stage involves matching the participants with non-participants of similar propensity scores. Several techniques have been suggested in the literature to find the “closest” neighbor as a matching partner. Five approaches have been commonly used to match treatment and control groups. Although all the approaches should normally yield the same results asymptotically, the choice of a matching approach could become important in small samples [3]. These approaches include nearest-neighbour matching; kernel-based matching, stratified matching, and radius matching. All these are based on the propensity score. The nearest neighbour simply identified for each household the “closest twin” in the opposite intervention status; then it computes an estimate of the technological effect as the average difference of household’s outcome between each pair of “matched households”. The nearest neighbor matching method is thus adopted for this study.

The propensity scores were computed using binary Probit regression models. Probit model was estimated for each state to compute probabilities of participation(propensity scores) used to compare Fadama II beneficiaries with non-beneficiaries of Fadama II project. The dependent variable in each of these models is a binary variable indicating whether the household was a beneficiary of the Fadama II project or not.

3. RESULTS AND DISCUSSION

3.1 Socioeconomic Characteristics of Respondents

In Kogi state, 67% of the beneficiaries and 72.1% of the non-beneficiaries in Fadama II participating LGAs were males, while in Kwara state, results reveal that 69.2% of the beneficiaries and 67.1% of the non-beneficiaries were males.

In Kogi, majority of the beneficiaries (34.7%) fell within the age range of 41-50, while the majority of non-beneficiaries fell within the age range 51-60. In Kwara, the results reveal that 54.1 % of the beneficiaries were at most fifty years of age, while 67.1% of the non-beneficiaries were. This implies that the respondents in the area were still in their active age bracket.

In Kogi, 90.1% of the beneficiaries and 80.1% of the non-beneficiaries were married, while in Kwara, 93.3% of the beneficiaries and 92.9% of the non-beneficiaries were married.

In Kogi, majority (63.6%) of the beneficiaries had more than six members in their households, while 52.9% of the non-beneficiaries in the participating LGAs had between 5-6 persons. In Kwara, majority (60.8%) of the beneficiaries, and majority (52.9%) of the non-beneficiaries had more than six members.

In Kogi state, 42.1% of the beneficiaries and 36.8% of the non-beneficiaries had secondary education. Whereas in Kwara state, 48.8% of the beneficiaries while 34% of the non-beneficiaries had secondary education.

The results in Table 1 reveal that crop enterprise was the major source of income to 57.5% of the beneficiaries and 64.2% of the non-beneficiaries in Kogi state. Table 2 shows that in Kwara state, crop enterprise was the major source of income to 59.1% of the beneficiaries and 62.5% of the non-beneficiaries. The high contribution of crop enterprise as a source of income may be attributed to the focus of the project towards crop development.

3.2 Impact Analysis Results

Table 3 shows the income accrued to various activities with and without the project in Kogi and Kwara states. The results reveal that in Kogi (Kwara) crop income without Fadama was

251 ~~₦111, 275~~ (₦119, 275), while it was ~~₦211, 005~~ (240, 000) with Fadama among the
 252 beneficiaries. Livestock income with Fadama was higher (N33, 000.7/ ~~₦30, 400.2~~) than without
 253 (~~₦16, 798.1/₦26, 856.7~~) among the beneficiaries. Fish income with Fadama was ~~₦7, 150.70~~.
 254 The results imply positive impact of the intervention on income of the beneficiary respondents.

255 **Table 1.Major source of income and incomes from other sources in Kogi State**

Source of income	Beneficiaries (%)	Non-beneficiaries (%)
Crop	69(57.50%)	77(64.20%)
Livestock	9(7.50%)	7(5.83%)
Fishery	1(0.83%)	14(11.70%)
Petty trade	6(5.00%)	5(4.17%)
Salary/wages	27(22.50%)	7(5.83%)
Artisan	4(3.33%)	8(6.67%)
Others	4(3.33%)	2(1.67%)
Total	120(100%)	120(100%)

256

257 **Table 2 .Major source of income and incomes from other sources in Kwara State**

Source of income	Beneficiaries (%)	Non-beneficiaries (%)
Crop	71(59.10%)	75(62.5%)
Livestock	10(8.30%)	10(8.33%)
Fishery	2(1.70%)	10 (8.33%)
Petty trade	11(9.20%)	5(4.17%)
Salary/wages	16 (13.30%)	14(11.7%)
Artisan	2(1.70%)	4(3.33%)
Others	8(6.70%)	2(1.67%)
Total	120(100%)	120 (100%)

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260 **Table 3.Mean Income from different activities (in Naira)**

Activity	Kwara	Kogi
Crop income without Fadama	119,275	111,275
Crop income with Fadama	240,000	211,005
Livestock income without Fadama	26,856.7	16,898.1
Livestock income with Fadama	30,400.2	33,000.7
Fish income without Fadama	5,450	7,150.7
Fish income without Fadama	8,816.7	10,888.6
Income from other sources	14,554.6	24,504.2

261 Source: Field survey.

262 Table 4 implies a positive impact of the intervention on the yields of major arable crops in the
 263 study areas. In Kogi, the yield of maize among the beneficiaries without Fadama was 1,367.1 kg
 264 and 3113.4 kg with Fadama, the yields of rice without Fadama and with Fadama were 900.92kg
 265 and 1,661.7kg, respectively; the average yield of sorghum with Fadama was 1,002.1kg, while
 266 without Fadama was 611.2.3kg. The average yields of cowpea with and without Fadama were
 267 1422.1kg and 1006.6kg, respectively. The yield of soya bean was also higher (213.3kg) with
 268 Fadama than (71.2kg) without Fadama,while the yield of millet with and without Fadama was
 269 89kg and 56kg, respectively.

270 In KwaraState, the project also impacted significantly on the yields of major arable crops
 271 in the area. The yield of maize among the beneficiaries without Fadama was 1,969kg and 4,
 272 461.54kg with Fadama; the yields of rice without Fadama and with Fadama were 863.92kg and
 273 1,531.67kg, respectively; the average yield of sorghum with Fadama was 921kg and 523.3kg
 274 without Fadama.. The average yield of cowpea with and without Fadama was 1367.9kg and
 275 1227.5kg, respectively. The yield of soya bean was also higher (122.5kg) with Fadama than
 276 (62.8kg) without fadama.. The yields of millet with and without Fadama were 91.2kg and 49kg,
 277 respectively.

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279

280 **Table 4. Impact Fadama II on yield of major arable crops**

Crop	Beneficiaries In Kogi	Beneficiaries in Kwara
Maize		
Without Fadama	1,367.1	1,969
With Fadama	3,113.4	4,461.54
Rice		
Without Fadama	900.92	863.92
With Fadama	1,66 1.7	1531.67
Sorghum		
Without Fadama	611.2	523.3
With Fadama	1002.1	921.0
Cowpea		
Without Fadama	1,007.6	1227.5
With Fadama	1,422.1	1367.9
Soya bean		
Without Fadama	71.2	62.8
With Fadama	213.3	122.5
Millet		
Without Fadama	56	49.0
With Fadama	89.4	91.2

281 Source: Field survey.

282

283 3.3 Propensity Score Matching Method Results

284 3.3.1 Impact of FadamaIIProject on Household Income

285 Table 5 shows the estimatesof the impact of Fadama II on household income, consumption,
 286 productive assets and livestock assets in Kogi state. The results show that the average income of
 287 participants was ₦28173.68, while ₦25505.26 was obtained for non-participants, that is, the
 288 participants earned extra average income of ₦ 2668.42 more than the non-participants, implying
 289 that Fadama II impact positively on the poor who participated in the programme.

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293 **Table 5. Impact of FadamaII on rural households in Kogi State**

Outcome variable	Treated	Control	Difference	S.E	T-Stat
Household Income	28173.6842	25505.2632	2668.42105	4481.30016	0.60
Household consumption	1257.78947	1186.94737	70.8421053	340.837656	0.21
Productive Assets	746442.105	223347.368	523094.737	164622.697	3.18
Livestock Assets	109152.632	86268.4632	22884.1684	20872.6929	1.10

294 Source: Data Analysis

295 In Kwara, Table 6 reveals that the average income of participants was ₦54858.06 while
 296 ₦45018.48 was obtained for non-participants. The participants earned extra average income of
 297 ₦9839.58 more than the non- participants, implying that Fadama II impact positively on the poor
 298 who participated in the programme. Result from PSM estimates shows a significant effect of the
 299 programme on participants at 5% level.

300 **Table 6. Impact of Fadama II on rural households in Kwara State**

Outcome variable	Treated	Control	Difference	S.E	T-Stat
Household Income	54858.0645	45018.4839	9839.58065	7109.4336	1.38
Household Consumption	3678.46778	1780	1898.46774	1042.60362	1.82
Productive Assets	611604.032	13075	598529.032	107760.91	5.56
Livestock Assets	104491.155	18603.2258	85987.929	21443.5482	4.01

301 Source: Data Analysis

3.3.2 Impact of FadamaII on Household Consumption

Table 5 shows the estimate of impact of Fadama II on household consumption in KogiState. The results show that participants on average consumed ₦70.84 more than the non-participants within fadama zone, implying that Fadama II impact positively on the consumption of the poor who participated in the programme. However, the result is not statistically significant.

Table 6 shows the estimate of impact of Fadama II on household consumption. The results show that in Kwara, the participants consumed extra average of ₦1898.47 more than the non-participants within Fadama zone, implying that Fadama II impact positively on the consumption of the poor who participated in the programme. Result from PSM estimates shows a significant effect of the programme on participants at 5% level.

3.3.3 Impact of Fadama II on Productive Assets

Table 5 shows the estimate of impact of Fadama II on productive assets in KogiState. The participants earned extra average productive assets of ₦523, 094.74 more than the non-participants within fadama zone, implying that Fadama II impact positively on the poor by improving their productive asset more than the non-participants. Result from PSM estimates shows a significant effect of the programme on participants at 5% level.

Table 6 shows the estimate of impact of Fadama II on productive assets in KwaraState. The participants earned extra average productive assets of ₦598529.032 more than the non-participants within fadama zone, implying that Fadama II impact positively on the poor by improving their productive assets more than the non-participants. Result from PSM estimates shows a significant effect of the programme on participants at 5% level.

3.3.4 Impact of Fadama II on Livestock Assets

Table 5 shows the estimate of impact of Fadama II on livestock assets in Kogi state. The participants earned extra average livestock assets of ₦22, 884.17 more than the non-

participants within Fadama zone, implying that Fadama II impact positively on the poor by improving their livestock assets more than the non-participants. However, the results are not significant.

Table 6 shows the estimate of impact of Fadama II on livestock assets in Kwara state. The participants earned extra average livestock assets of ₦85987.93 more than the non-participants within fadama zone, implying that Fadama II impact positively on the poor by improving their livestock assets more than the non-participants. Result from PSM estimates shows a significant effect of the programme on participants at 5% level.

3.4 Impact of Fadama II on Household welfare

The average household's consumption expenditure, calorie/protein intake, and poverty level in Kogi and Kwara States are shown in Tables 7 and 8, respectively. The food expenditure items included food produced and food purchased by the households. The non-food expenditure items in 7 shows that average household per capita daily total consumption expenditures were ₦269, ₦218 and ₦192 for the Fadama II beneficiaries and non-beneficiaries, respectively. The average daily expenditure on food was higher than the corresponding values for non-food expenditures. Households of participants had per capita daily food consumption of ₦214 compared with that of non-participants having a figure of ₦183.

Table 8 shows that the household per capita daily consumption expenditures were ₦251 and ₦217 for the Fadama II beneficiaries and non-beneficiaries in participating LGAs, respectively. The average daily expenditure on food was higher than the corresponding values for non-food expenditures. Households of participants in Fadama II LGAs had per capita daily food consumption of ₦205 compared with that of non-participants in participating LGAs having a figure of ₦183.

Daily food intake was calculated by converting household food consumed into calorie and protein equivalents [10]. In Kogi state, the average per capita daily intake for the beneficiaries was 2,608 kilocalories per person per day, which was higher than the minimum of 2,250 kilocalories per person per day recommended for the country. However, the average per capita daily intake for non-beneficiaries in participating LGAs (2114 kilocalories per person per day) was lower than the minimum per person daily recommendation. The per capita daily protein

intake was higher for the beneficiaries (39 g) than for the non-beneficiaries in Fadama LGAs (37 g) although both are higher than the 35 g minimum per person per day recommended from animal material [7].

In Kwara state, the average per capita daily intake for the beneficiaries was 2,558 kilocalories per person per day, which was higher than the minimum of 2,250 kilocalories per person per day recommended for the country. However, the average per capita daily intake for non-beneficiaries in participating LGAs (1679 kilocalories per person per day) was lower than the minimum per person daily recommendation. The per capita daily protein intake was higher for the beneficiaries (37.1g) with a figure higher than the 35g minimum per person per day recommended from animal material [7].

Based on the World Bank rule of thumb approach of two-thirds total consumption expenditure the poverty level was calculated as shown in Tables 7 and 8. The poverty line so generated for Kogi (Kwara) state was ₦161 (₦157), about \$1 USD. Based on this poverty line, 30 (32) percent of the beneficiaries were below the poverty line. However, the proportion of households (56 percent) below the poverty line was higher among non-participating households. This shows that Fadama II activities have helped to reduce the level of poverty among participants in the study area.

Table 7. Calorie and protein consumption and consumption expenditure in Kogi State

	Beneficiaries	Non-beneficiaries
Per capita per day calorie (kcal)	2608	2114
Per capita per day protein (g)	39.1	30.3
Total expenditure	269	218
Non-food expenditure	56	37
Food	214	183
Poverty level (%) based on ₦157 poverty line	30	47

₦160 = 1\$ Source: Data Analysis

379

380 **Table 8. Calorie and protein consumption and consumption expenditure in Kwara State**

	Beneficiaries	Beneficiaries
Per capita per day calorie (kcal)	2558	1679
Per capita per day protein (g)	37.1	24.8
Total expenditure	251	217
Non-food expenditure	44	33
Food	205	183
Poverty level (%) based on ₦157 poverty line	32	48

381 ₦160 = 1\$

382 Source: Data Analysis

383

384 **4.CONCLUSIONS AND RECOMMENDATIONS**

385 The Fadama Development project (FDP) is an AfDB- financed project with counterpart
386 funding contribution from the State and Local Governments of Nigeria. Kogi and Kwara states
387 are among the six covered by the project.

388 The project sector goal was to reduce poverty by improving the living condition of the
389 rural poor, contribute to food security and increase access to rural infrastructure. Specifically, it
390 was designed to enhance agricultural production, productivity and value addition of smallholders
391 and rural entrepreneurs in Fadama areas on a sustainable basis. It has 3 components namely;
392 Capacity Building and Advisory Services, Rural Infrastructure Investment as well as Project
393 Management and Coordination. This study was undertaken with the broad objective of
394 quantifying the impacts of Fadama II implementation on the lives of the participants in Kogi and
395 Kwara states.

396 This study has shown that the AfDB intervention impacted positively on the target
397 population in the study area. It has impacted positively on their income, consumption, productive
398 and livestock assets and has reduced poverty among the beneficiaries. These impacts would have

399 been greater in magnitude if all the components of the project were fully implemented. The study
400 is therefore suggesting that sustenance and expansion of the project because of its positive
401 impact on the welfare of the beneficiaries through greater support from donor, local, state, and
402 federal governments of Nigeria.

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