

Income Distribution In Small-Scale Irrigation Projects, A Case Study of Wurno Irrigation Project Sokoto State, Nigeria

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ABSTRACT

Farm income distribution among farmers at the Wurno Irrigation project Sokoto State was studied. Respondents were drawn from six villages that were selected randomly. From each of the six villages 20 respondents were selected randomly, to arrive at a sample size of 120 respondents. Structured questionnaire was used to collect data on both rain fed and irrigated crops for the 2006 rainy season and 2006/2007 irrigation season. However, 116 questionnaires were used for the analysis. Descriptive statistics, decile ratio test, the Lorenz curve and Gini concentration ratio were used for data analysis. Results of the study revealed that majority (98.28%) of the respondents were male, the age distribution shows that 32.76% were aged 31-40 years. Rice was mainly cultivated in the rainy season while onion and garlic were cultivated during the dry season. For the dry season crops, an average farm income of ₦62, 523.78 was received by 35.24% of the respondents representing 31.08% of the aggregate income from dry season crops. The computed Gini coefficient of 0.5985 and 0.6212 implies highly unequally distributed income for irrigated and rain fed crops respectively. It was recommended that road network within the project area should be maintained regularly to improve transportation network, minimise post harvest losses and improve returns.

INTRODUCTION

Agricultural production in Nigeria can generally be described as rainfed. However, the erratic nature of rainfall in some parts of the country, especially the northern parts have constituted great constraints to increased food production among other factors (Falusi, 2000). Abdullahi (1985) reported Sokoto State as one of the northern states where water poses a limiting factor to agricultural production due to inadequate and erratic rainfall, with some parts of the state receiving less than 600mm of annual rainfall within a duration of five months or less. Baba and Adedibu (1998) noted that as a result of the erratic nature of rainfall in the area, large areas of land are left uncultivated, while only crops and crop varieties that are early maturing and/or drought tolerant are grown even if they are not the most productive in terms of yield and income. Irrigation was pointed out by Mue'zu and Abdulmumin (1991) as the only reasonable alternative of overcoming the constraint of inadequate water for improved food production, to meet the food demand of the increasing population. According to Baba and Adedibu (1998), the expected increased production would, apart from making more products available, improve farmer's and their living standards. Small and

Carruthers (1990) have also observed that irrigation is becoming crucial to food security, employment and income growth in poor countries.

In recognition of the potential benefits of irrigation, small-scale irrigation projects were established in Sokoto State. One of such projects, the Wurno irrigation project was established by the then Northern Nigerian Government. The irrigation facility provided enables farmers to grow dry season crops as well as to make up for the shortfall in rainfall for growing rainy season crops. The objective of this is to bring about an increase in agricultural output and consequently an increase in farm income. A number of studies have indeed confirmed that irrigation has increased agricultural output and farm income in the Wurno area (Baba and Adedibu, 1998) and elsewhere in Sokoto State (Baba *et al.*, 1997; Baba *et al.*, 2001). However, little or no research work has been done to ascertain the distribution of income among different categories of farmers participating in irrigated agriculture in the State. This study examines the distribution of income among farmers at the Wurno Irrigation Project.

METHODOLOGY

The Wurno Irrigation project is located in Wurno Local Government Area (between Longitude 5° 17' 27" - 5° 46' 54" E and Latitude 13° 8' 10" - 13° 24' 0" N) about 40km north-east of Sokoto town. Established by the then Northern Nigerian Government in 1958, the project covered an initial area of 600 hectares. In recognition of the benefits of the project, the Sokoto State Government in 1991 rehabilitated the project and expanded the project area to 1,200 hectares divided into 2,800 plots of 0.4 hectare each. Not less than 3000 farmers participate in the project where rice is grown as the main crop during the rainy season and onion and garlic are grown as the main crops in the dry season.

Six villages namely Wurno, Yar Wurno, Lugu, Gidan Modl, Gidan Bango and Gidan Kamba were randomly selected for the study. From each of the selected villages, 20 farmers participating in the project were randomly selected to arrive at a sample size of 120 respondents.

Structured questionnaire were used to collect data on crops cultivated, inputs used, cost of production as well as output and income realized for both rain fed and irrigated crops. Data collection covered the 2006 rainy season and the 2006/2007-irrigation season. Out of the 120 questionnaires, 116 were used for analysis. Descriptive statistics, decile ratio test, the Lorenz curve and Gini concentration ratio were used for data analysis. Descriptive statistics used include means, frequencies and percentages. The decile ratio test was used to analyse the location of inequality in the various income distributions. The Lorenz curve was used to compare the cumulative shares of income ordered from the poor to the rich, with income shares that would accrue to recipients under perfect equality.

The Gini concentration ratio is defined as $G = 1 - \sum_{i=1}^n XY_i \dots (1)$
Where G = Gini coefficient
 X = percentage of farm income recipients
 Y = cumulative percentage of aggregate farm income

The Gini concentration ratio is the most commonly used measure of income distribution and it summarizes the Lorenz curve. The value of the Gini Index varies from zero to unity. It approaches zero as income distribution tends to perfect equality and unity as it tends to extreme inequality.

RESULTS AND DISCUSSION

Personal Characteristics of Respondents

Majority (98.28%) of the respondents were male while 1.72% were female. Also 97.41% were married and the remaining 2.59% were single. The age distribution shows that a high proportion (32.78%) of the respondents was aged between 31 and 40 years, 27.59% were aged between 41 and 50 years and 9.48% were aged between 20 to 30 years (Table 1). This implies that there were more of middle-aged farmers participating in the project activities compared to either young or old farmers.

With respect to education, result of the study shows that 58.62% attained Qur'anic education, 21.55% attained primary education and 6.89% each attained secondary and adult education (Table 2). This shows that the literacy level among farmers at the irrigation project was low. Low level of education could have negative effect on farmers' ability to understand and use improved or new agricultural technologies for better output and income.

Analysis of family size (Table 3) shows that 37.07% of the respondents had family sizes of between 6 and 10 members, 33.62% had between 2 and 5 members while 2.59% of the respondents had family sizes of 21 members or more. Family size is an indicator of food requirements as well as family labour availability.

All the respondents were experienced project farmers with 38.79% having between 6 and 10 years of farming experience in the irrigation project. Up to 22.41% had between 1 and 5 years experience and 18.97% had 21 years or more of farming experience in the irrigation project (Table 4).

Crops Cultivated

Both rain fed and irrigated crops were cultivated at the Wurno Irrigation Project. Majority (83.62%) of the respondents cultivated both rain fed and irrigated crops, 12% cultivated rain fed crops only and 7% cultivated irrigated crops only. Rice was grown as the major rain fed crop by all the respondents who cultivated rain fed crops, while onion and garlic were grown as the main dry season crops. Although rice was grown in the rainy season, its cultivation was made possible by the availability of irrigation facilities that enabled application of water at the beginning of the rainy season when the rains were not well established, during drought and after the rainy season, before harvest.

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Table 1: Age distribution of respondents

Age (years)	Frequency	Percentage
20-30	11	9.48
31-40	38	32.76
41-50	32	27.59
51-60	21	18.10
61 and above	14	12.07
Total	116	100

Source: Field Survey, 2007

Table 2: Distribution of respondents according to educational Attainment.

Level of education	Frequency	Percentage
Primary education	25	21.55
Secondary education	8	6.89
Tertiary education	7	6.03
Adult education	8	6.89
Qur'anic education	68	58.62
Total	116	100

Source: Field Survey, 2007

Table 3: Distribution of respondents according to family size

Family size	Frequency	Percentage
Single	3	2.59
2-5	39	33.62
6-10	43	37.07
11-15	20	17.24
16-20	8	6.89
21 and above	3	2.59
Total	116	100

Source: Field survey, 2007

Table 4: Distribution of respondents according to farming Experience at the Wurno Irrigation Project

Years of experience	Frequency	Percentage
1-5	26	22.41
6-10	45	38.79
11-15	17	14.66
16-20	6	5.17
21 and above	22	18.97
Total	116	100

Source: field survey, 2007

Table 3: Distribution of farm income for rain fed and irrigated crops among respondents at the Wurno irrigation project

Level of farm income (N)	Irrigated crops			Rainfed crops		
	Average income (N)	% of respondents	% of aggregate income	Average income (N)	% of respondents	% of aggregate income
< 0	0	-	-	-2,900	0.9	-0.08
1-25,000	13,513.33	8.87	1.88	12,915.46	38.53	14.8
25,001-50,000	36,791.15	24.76	12.83	37,626.10	37.61	42.11
50,001-75,000	62,523.76	39.24	31.06	56,791.00	16.35	32.1
75,001-100,000	89,931.62	10.46	13.29	81,060.00	4.6	11.07
100,001-125,000	112,603.33	11.43	16.16	-	-	-
125,001-150,000	136,406.00	4.76	9.16	-	-	-
150,001 and above	202,142.00	4.76	13.80	-	-	-
Total	-	100	100	-	100	100

Source: Field Survey, 2007.

Table 4: Distribution of farm income received by various decile groups for irrigated and rainfed crops at the Wurno irrigation project

Decile groups farmers (x)	% of farmers	Cumulative % of farmers	Irrigated crops			Rainfed crops		
			% of aggregate income	Cum. % of Aggregate income (y)	ΣXY	% of aggregate income	Cum. % of aggregate income (y)	ΣXY
First 10 percent	0.1	0.1	2.57	0.0257	0.0026	1.23	0.0123	0.0011
Second 10 percent	0.1	0.2	4.54	0.0711	0.0071	3.15	0.038	0.0038
Third 10 percent	0.1	0.3	6.11	0.1142	0.0134	4.59	0.0987	0.0066
Fourth 10 percent	0.1	0.4	7.70	0.212	0.0212	6.46	0.1943	0.0158
Fifth 10 percent	0.1	0.5	8.85	0.3008	0.0301	8.66	0.3409	0.0241
Sixth 10 percent	0.1	0.6	9.90	0.3902	0.039	10.80	0.3497	0.0346
Seventh 10 percent	0.1	0.7	9.90	0.49	0.049	12.84	0.4791	0.0479
Eighth 10 percent	0.1	0.8	12.68	0.6188	0.0618	14.46	0.6237	0.0623
Ninth 10 percent	0.1	0.9	13.20	0.7128	0.0712	17.06	0.7949	0.0794
Tenth 10 percent	0.1	1	22.74	1	0.1	20.66	1	0.1
Total	-	100	-	-	0.4834	100	-	0.3767

Source: Field survey 2007; Gini coefficient for irrigated crops = $1 - 0.4634 = 0.5366$; Gini coefficient for rain fed crops = $1 - 0.3767 = 0.6233$

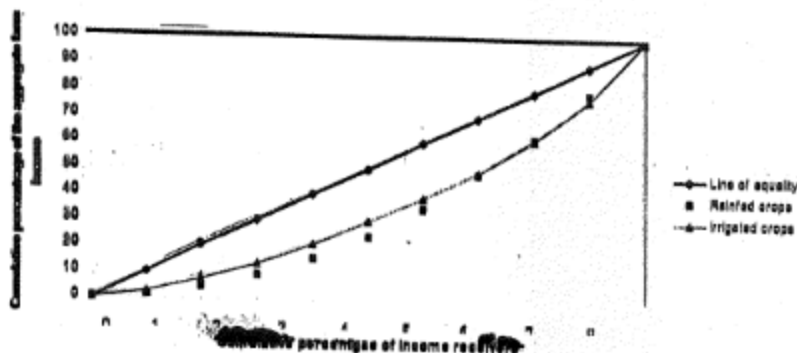


Fig. 1: Lorenz curves showing the distribution of farm income among farmers in Wurno irrigation project