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Synopsis: Constraints for small-scale private irrigation systems in the North Central zone of Nigeria

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RESEARCH OVERVIEW

The limited contribution of irrigation to growth in Nigeria's agricultural sector is considered to be one of the causes of slow agricultural transformation in the country. Information is limited regarding small-scale private irrigation systems, their expansion potential, and their constraints relative to that on public irrigation schemes. Such information is particularly limited in the North Central zone.

Using nationally-representative farm household data and a case study in the North Central zone, this study shows that, first, that the share of small-scale farmers in Nigeria who intensively irrigate some of their crops has declined in recent years, while the share of irrigating farmers who engage in less intensive irrigation has increased, and, secondly, high production costs, particularly labor costs, are the major constraints to intensive irrigation. Raising the competitiveness of more intensive small-scale private irrigation systems will require significant reductions in production costs through efforts to increase overall productivity through agricultural research and development, including by public agencies. Simply reducing the costs of non-labor material inputs, like fertilizer, seeds, and pumps, through the use of subsidies, as has conventionally been done, likely will not lead to sufficient cost reductions to make intensive small-scale irrigation profitable. [1]

BACKGROUND

Table 1 summarizes key characteristics of irrigator households in Nigeria. These were drawn from data collected by the Living-Standard Measurement Study - Integrated Survey on Agriculture (LSMS-ISA) over three waves in 2010/11, 2012/13, and 2015/16. Only 3.4 percent of farm households irrigate any of their crops. Only 1.6 percent of the farmed area is irrigated. Most irrigator-households are smallholders and are found in the North West and the North East zones, while the North Central zone, together with the Southern zones, accounts for a much smaller share. Most irrigation, if used, is applied to maize, rice, selected vegetables, and peppers.

Table 1. General characteristics of irrigator households in Nigeria

Farm households irrigating, percent	3.4
Farm area irrigated, percent	1.6
Area irrigated per irrigating household, median, ha	0.3
Average farm size per irrigating household, ha	0.5
Regional share of irrigated area, percent	
North West	60
North East	19
North Central	15
South East	1
South South	2
South West	4
Irrigators irrigating each crop, percent	
Rice	25
Maize	29
Vegetables (onion, okra, pepper, tomato)	33
Pepper	22
Banana / plantain	13
Legumes	22
Sugarcane	4

Source: Authors' calculations from combined LSMS-ISA datasets.

RESEARCH APPROACH AND RESULTS

A typology of small-scale farm households that irrigate their crops was constructed using the LSMS-ISA data. These households reported the use of irrigation in at least one of the three waves of the LSMS-ISA survey. These irrigator households were grouped into six types based on their agricultural production behavior, irrigation intensification level, and agroecological and socioeconomic characteristics.

[1] A detailed discussion of this research can be found in NSSP Working Paper 47, *Constraints for small-scale private irrigation systems in the North Central zone of Nigeria: Insights from a typology analysis and a case study.* http://ebrary.ifpri.org/cdm/singleitem/collection/p15738coll2/id/131437/rec/8

Table 2. Distribution of different types of irrigators over time, number

	Survey round		
Type of irrigators	2010-11	2012-13	2015-16
Medium-scale mechanized irrigators	71	32	69
Intensive pump irrigators	193	130	Few
Intensive stream irrigators	104	120	49
Pump irrigators	190	105	250
Resource-poor temporary irrigators	177	230	351
Temporary irrigators	272	372	456
Observations	1,007	988	1,175

Source: Authors' estimations through modified cluster-analyses. "Few" indicates no observations in the data in the type.

Table 2 summarizes the distribution of irrigator households by type. Despite past government efforts to stimulate the growth of small-scale private irrigation systems, Table 2 suggests that between 2010 and 2016 the numbers of relatively more intensive, permanent irrigators (the top three types) have been declining, replaced by less-intensive, temporary irrigators.

Table 3. Irrigation crop budgets in Abaji, FCT, 2017 dry season, thousand Naira per ha

	Rice	Maize	Pepper
Labor costs	572	298	961
Non-labor costs	155	143	446
Total cost	727	441	1407
Revenues	840	450	1448
Profit margin, percent	16	2	3
Labor cost share, percent	79	68	68

Source: Authors' compilation based on small survey of irrigators in the Abaji area, FCT, Nigeria.

We then investigated the production cost structure of small-scale private irrigation systems in the North Central zone, using the Abaji area of the Federal Capital Territory (FCT) as an example. 178 randomly-selected irrigators were interviewed after the 2017 dry season. Irrigators in this area belong to the relatively more intensive types of irrigators identified in Table 2. Table 3 summarizes their average cost structure for production of rice, maize and pepper under irrigation. Labor costs account for a substantial share of the total production costs.

The profit margin for these irrigating farmers is relatively small, so farmgate prices serve as a good approximation of their per-unit production costs. Farmgate prices of these crops in Nigeria are higher than in countries in Asia or USA (Table 4), even though these prices are considerably lower than the end-market prices Nigerian consumers face. The higher production costs in private irrigation systems in Nigeria accounts for much of the farmgate price difference between Nigeria and major developing countries in Asia.

Table 4. Farmgate prices of rice (paddy), maize, and peppers in Nigeria and other countries, USD per mt

Countries and zones	Rice (paddy)	Maize	Pepper
Bangladesh	180	181	499
China	313	276	611
India	200	123	
Philippines	281	220	633
Thailand	231	182	
USA	251	146	834
Nigeria	394	380	1071
North Central	571	563	1344
North West and North East	359	340	1075

Source: Authors' calculations based on FAOSTAT. Rice (paddy) and maize prices are average prices between 2001 and 2015, while pepper prices are average prices between 2010 and 2013.

CONCLUSIONS

In Nigeria, small-scale private irrigation has not been widely adopted, and, where it is practiced, is not done intensively. Intensifying small-scale irrigation requires improving the economic competitiveness of irrigating farmers by reducing per-unit production costs. Because of relatively their small cost shares, conventional approaches of subsidizing non-labor inputs, including fertilizer, seeds, and pumps, may not lead to significant cost reductions. Reducing production costs will require increasing production without increasing overall input use from current levels. Increased agricultural research and development, including the development of improved crop varieties with higher responses to water and other inputs, is likely to be an important factor for raising the competitiveness of these systems.

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