

AN ASSESSMENT OF THE IMPACT OF SMALL-SCALE IRRIGATION SCHEMES ON LIVELIHOODS AND POVERTY REDUCTION IN THE UPPER EAST REGION OF GHANA

Author's Name: ¹Letitia Sampo Apam, ²Mr. Karim Fusheini

Affiliation: ¹Department of Planning, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana, West-Africa

²GIMPA Business School, Ghana Institute of Management and Public Administration, Greenhill- Accra, Ghana, West-Africa

E-Mail: fwulensi@yahoo.com

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Abstract

The purpose of this research was to assess the impact of small-scale irrigation schemes on the livelihoods of smallholder farmers towards poverty reduction in the Upper East Region of Ghana. The focus is on small-scale irrigation that is practised, controlled, and managed by the farmers in their way. Both quantitative and qualitative methodologies were used in the investigation of the impact of the scheme on rural livelihoods. A sample of 300 respondents made up of smallholder farmers was selected using random sampling. Data was collected using interviews, questionnaires, and observation. Analyses were done using descriptive statistics. Tables and were employed in the presentation and analysis. The findings of the study revealed that irrigation affects the living conditions of smallholder farmers towards improving yields, expanding the length of employment, reducing hunger gaps, and at the meso level affects food prices, migration, and community asset building including roads. The outcome of the study serves as an input to policymakers and stakeholders concerned with developing semi-arid areas of the savannah on strategies to promote and improve small-scale irrigation farming to contribute to incomes, food security, and employment sustainably.

Keywords: Food Security, Impact, Livelihood Diversification, Small Scale Irrigation

INTRODUCTION

Improvement of the irrigation system in sub-Saharan Africa is becoming a key component in the development of the area. This process is evidenced by the significant increases in productivity and profitability of farming (AGRA, 2018; de Bont, 2018a; Veldwisch et al., 2019; Woodhouse et al., 2017; World Bank, 2018). Small-scale irrigation system development is seen as a process that involves farmers working together to develop and improve their farming systems (Veldwisch et al., 2019, p. 2). Agriculture is Ghana's largest private sector, accounting for almost 30% of the country's GDP. It is a vital source of inputs to the country's manufacturing industry. In 2019, the agriculture sector absorbed over 35% of the workforce. The agriculture sector's development rate declined from 2.9% in 2016 to 6% in 2017, and it is expected to grow at a rate of 2.6% in 2019 and 2.9% in 2020. The decline was caused by the coronavirus pandemic. As thus, farming is seen by numerous individuals as a vital factor in Ghana's economic development and advancement process (Lefore et al., 2019; Mdee & Harrison, 2019). In 2018, the total land area of Ghana is approximately 238,539 km². It is mainly composed of a large area of cultivated land which is approximately 58,000 km² and 11,000 hectares of irrigation system. The dominant part of rural area individuals relies to a great extent upon small-scale cultivation as the significant survival

strategy and practically no other livelihood sources. Asuming- Brempong et al (2005) state that around 3,225,910 amounting to 81% of the farming population are smallholder farmers whose survival relies upon cultivating the land and is rain-fed. The main source of income for these individuals is the land that they can use for their livelihood. This land should not be more than 1.2 ha in size (Andah et al., 2003). The small landholding size has significant implications for the level of production and quality of the crop. This paper argues that the implementation of modern agricultural technology can help improve the productivity of the farms. Poverty is the inability to command sufficient resources to satisfy basic needs (Todaro, 2003). This means that people are unable to meet their basic needs such as food, shelter, education, and health. This is a major factor that affects their decision-making. To address the above issue several efforts have been made during the years past and now to address the situation. These efforts include the fertilizer subsidy, The Northern Rural Growth Project (NRGP), The Rice Sector Support Project (RSSP), the Food Security and Environmental Facility (FSEF) Project and the establishment of the Savannah Accelerated Development Authority (SADA), the Millennium Development Authority and the Bui Dam City Project among others. Each of these projects and institutions has put irrigation technology development as a tool to increase production and productivity especially in northern Ghana where the weather conditions are relatively unpredictable. All these efforts are geared towards improving the livelihoods of peasant farmers but have met a lot of challenges. The fundamental issue here is whether the cry for irrigation as a technology for all-year farming has an impact on poverty reduction and livelihood development among rural farmers in Ghana and especially within the Upper East region. The objective of this paper is therefore to find out whether efforts towards irrigation technology development is yielding fruits on poverty reduction and as well as providing alternative livelihoods towards reducing poverty within local and the national economic development context using Bawku west District, Garu Tempane district and Bawku Municipality within the Upper East region as a case study.

LITERATURE REVIEW

Poverty as a Concept

Poverty is described as a lack of sufficient resources to meet basic human needs such as food, clean water, housing, and clothes. However, in today's society, access to health services, jobs, and even transportation can be included. The World Bank is a highly respected expert on the subject of "extreme poverty." The World Bank maintains a measure known as the International Poverty Line, which defines extreme poverty as living on less than US\$1.90 per day as of 2015. (The "moderately poor" are those that make between \$1.90 and \$3.10 a day.) This is the amount. This number is based on the monetary value of a person's consumption rather than income alone. In most people's minds, poverty is defined solely by their wealth and consumption. Other methods, on the other hand, argue that other considerations must be considered. This is because money does not reveal the entire story. Typically, as the poor characterize their suffering, they do so in terms that goes beyond just not having enough money. As per the National Development Planning Commission (NDPC, 2003), poverty is the absence of fundamental necessities and services like food, clothing, and shelter to rest after the days' work. The NDPC stresses that it implies a failure to send kids to school; not having the option to pay for clinical consideration for the family when they are debilitated, or having no property. This is shown through hunger, unhealthiness, high hopelessness and death rates, failure anticipation, expansion in school dropout, low degrees of education, and expansion in wrongdoing. This meaning of poverty by the NDPC aligns with the ongoing worldwide attitude toward poverty (World Bank, 2000; IFAD, 2002; UNDP, 2000). These

bodies see poverty regarding income levels however in relative terms and a cycle as opposed to a condition. Poverty measurements are wide and complex and fluctuate between locales, nations, communities, and individuals. Perpetually, the fundamental necessity of a daily existence liberated from poverty is access and qualification to an assortment of resources and livelihood strategies that can support families and people through the burdens and stuns of life.

The Concept of Livelihood

Livelihood is a concept that does not lend itself to one single definition. Whiles, it tends to be seen as resources and assets that can be evaluated and used to make ends meet; others see it as having access and control to resources. This view is certainly upheld by Cahn (2003) in his contention that livelihood contained the abilities, resources (counting both material and social assets), and exercises needed for means of living: a livelihood is feasible when it can adapt to and recuperate from pressure and stuns and keep up or upgrade its capacities and resources both now and in the future (Carney, 1998). The accentuation on access and control is impacted by the social, political, social, and financial settings of the general public in which the individual is found. Ellis (2000) concurs with this declaration when in his meaning of a 'livelihood' he has set more accentuation on the admittance to resources and exercises that are impacted by friendly relations (gender, class, kin, belief systems) and establishments. Niehof et al. (2001) portray a livelihood as a material method whereby one makes a living and livelihood generation alludes to the heap of exercises that individuals embrace to provide their necessities. Be that as it may, this is a means to an end, which likewise incorporates parts of food security, providing a home, wellbeing, security, and sustainability. In other words, improving provincial livelihoods includes something other than amplifying the creation of yields or domesticated animals. Albeit most agricultural studies are about normal assets, plants, and animals, agricultural scientists cannot overlook the reality that agriculture is a human activity. The cultivating frameworks that individuals create depend on social, cultural, economic, and psychological, and strategy factors, just as on normal or biophysical factors. The resources in the focal point of this study are irrigation facilities and access to irrigable land, labour, and service delivery by organisations and departments. Things that individuals do to make money or income can be supposed to be livelihood procedures. Livelihood strategies are made out of exercises that produce the means for family endurance (Ellis, 2000). These strategies change as conditions of the environment change and culture also change.

Effects of Irrigation on Livelihoods and Poverty

Investments in irrigation schemes have been shown in the literature to improve livelihood outcomes such as revenue, health, sustenance, food security, and jobs (Dittoh et al., 2013; Hussain & Hanjra, 2004; Namara et al., 2011). Irrigation schemes have a particularly positive effect on livelihoods and poverty in areas where farming is the main source of income. Namara et al. (2005) assessed the near effect of small-scale irrigation schemes and concluded that it is profitable and has an impact on crop yield. The investigation evaluated the specialised and monetary efficiencies in the cultivation of banana, cotton, and groundnut under irrigation schemes, and the findings indicate that irrigation-based crop production is technically and monetarily viable. The report also looked at the poverty impact of small-scale irrigation schemes by comparing the poverty level of irrigators and non-irrigators, concluding that irrigators had higher income status on average than non-irrigators. Irrigation schemes also have a significant effect on farming habits and the form of the crop to plant, according to the report. The authors also noted that irrigators produce high-value crops than non-irrigators and women, in particular, make more income and can cater

to their family's nutritional needs. The primary direct influence, according to Lipton et al (2003), is on yield levels. Lipton and others discovered that irrigation schemes help absolute farm yield and, as a result, increase farmers' earnings with unchanged values, based on an investigation of the impact of irrigation schemes in Asia. Expanded yield levels can arise for three reasons, according to the study. Irrigation increases yields by reducing crop failure caused by erratic, unreliable, or inadequate rainfall. Also, irrigation allows for multiple cropping, increasing annual yields. Finally, irrigation allows for the use of a larger region of land for crop production in regions where rain-fed production is impractical or negligible. According to (Smith, 2004) evidence for these effects is widespread, well documented, and uncontroversial. For example, the FAO suggests that irrigation can increase yields for most crops by 100 to 400% and that higher, less risky, and more continuous levels of rural employment and income result from the higher cropping intensities, yields, and more intensive and higher value crops and cultivation techniques of irrigated compared to rain-fed agriculture (Smith, 2004). When attempting to determine the impact of irrigation on farmer production, Hussain and Hanjra (2004) stated that irrigation allows poor and smallholder farmers to attain higher yields and that the productivity of crops grown under irrigated conditions is often significantly higher than that of the same crops grown under non-irrigated/rain-fed conditions. Increased productivity aids in can returns on farmers' land and labour resources. According to Hussain and Hanjra, access to reliable irrigation schemes will enable farmers to access new technology and improve productivity, resulting in increased viability, higher yield, and higher returns from agriculture.

RESEARCH METHODOLOGY

Both an experimental design and a case study were used in this study. It was experimental in that it contrasted treatment classes, in this case, farmers, families, and populations who use irrigation equipment to those that don't. This is referred to as "with and without contrast." Since the results of using small-scale irrigation schemes versus not using them were compared in this research, it suggested a controlled trial involving contrasts between suitable treatment settings. The intervention group is referred to as "farmers without irrigation infrastructure and technology" in this study, while the control group is referred to as "farmers with irrigation infrastructure and technology." The independent variable in this analysis is small-scale irrigation expenditure, while the dependent variables are livelihoods, agricultural transformation, and poverty reduction. The districts to be studied were sampled from seven out of nine districts because the study was interested in small-scale irrigation schemes, the districts where large-scale irrigation schemes were found were not to be considered for the study. The total smallholder farmer population in the region according to the regional MoFA Monitoring and Evaluation Unit (2011) fluctuates between 315,000 and 345,000 from 2005 to 2010. Out of this the estimated number of farmers who carry out small-scale irrigation farming was 11,448 (8,450men, 2,998 females). The region has nine districts from which all the different sample frames for the study falls. Both farmers and officers in organisations were sampled using the convenience sampling technique. Ten farmers were selected from each community that was sampled for the study. Cluster sampling was used to group selected districts into clusters, and then the convenience sampling technique was used to select farmers and households for study due to a lack of data on the location and demarcation of communities within the selected districts, as well as the non-organized structure of the communities. In-depth, interviews were carried out for selected groups and individuals. The groups included community leaders, experts, and farmer group leaders in both irrigated and non-irrigated communities, marketers of agricultural products. The quantitative data were analysed

with the assistance of the statistical software- Statistical Package for Social Sciences (SPSS).

RESULTS

Impact Areas of Irrigation Schemes

Comparison of farmers with and without irrigation in terms of access to credit

Credit is a livelihood asset that would contribute to the achievement of livelihood objectives and outcomes. Its availability and access to by farmers has a part to play in farmers' execution of their livelihood strategies reinforcing what Swamikannu and Berger (2009) had revealed about credit as an input to farming within the Upper East Region. Table 1 compared credit access by farmers between adopters and non-adopters of the practice of irrigation and the results indicates that 46% of the respondent who has adopted the practice of irrigation have access to credit and the rest of the 54% do not access credit for their farming practices. Compared to the non-adopters of irrigation that has only 39% of its members accessing credit facilities which is 7% less than the percentage of those accessing credit among respondents adopting the practice, as much as 60.7% of non-adopters do not have access to credit compared to 54% of the adopters. Though the percentage difference is not much but considering the potential effect of credit as an input to farming activities, it can contribute to some extent towards the output gains between these categories of farmers. Swamikannu and Berger (2009) confirmed this in a study on the impacts of credit on the welfare of the different farm types analysed by their study revealed that access to credit could increase the income of the 58 irrigation farm households (small dam and big dam farms) by 56% and 82 % respectively over the baseline income level, while the income of the rain-fed farm households would increase only by 22 %. In general, out of the 300 respondents, a total of 57% do not have access to credit postulating that only 42% of farmers in the region have credit support for their farming activities. This is confirming the findings of the PSIA (2005) which indicated that farmers within this ecological zone have the least access to financial services as compared to the other ecological zones of Ghana. The majority of this 42% who have access to credit are adopters to irrigation practice meaning irrigation farmers are more likely to receive credit support for their activities than their colleagues who do not.

Table 1: Comparison of Farmers with and Without Irrigation in Terms of Access to Credit

Practice irrigation	Access to credit		Total
	Yes	No	
With irrigation	46.0%	54.0%	100.0%
Without irrigation	39.3%	60.7%	100.0%
Total	42.7%	57.3%	100.0%

Source: Field Data, 2011

Yield Comparison: Rain Fed Farms with Irrigated Farms

Table 2 is comparing yields per hectare of different crops between irrigated farms and non-irrigated farms. From the available data, the yields in tonnage per hectare are varied between rain-fed farms and irrigated farms. Table 2 indicates that on the same size of land produced under irrigation and rain-fed, maize under irrigation would yield 2.6 times higher than cultivation under rain-fed.

Table 2: Yield for Some Selected Crops

Crop	Irrigated farm	Rain fed farm
	Yield (tons/ha)	
Tomatoes	10.5	6.5
Pepper	3.0	1.2
Leafy Vegetables	2.0	1.5
Onions	10-12	6-8
Maize	4.0	1.5
Rice	4.5	2.8
Millet	2.1	1.1
Okro	3.8	2.5

Source: MOFA, 2011.

For tomatoes, irrigated farms will yield 1.6 times higher than rain-fed farms on the same sizes of land with all things held constant except irrigation. The finding aligns with the FAO who suggest that irrigation can increase yields for most crops by 100 to 400% and that higher, less risky, and more continuous levels of rural employment and income result from the higher cropping intensities, yields, and more intensive and higher value crops and cultivation techniques of irrigated compared to rain-fed agriculture FAO, (1996) in Smith (2004).

EFFECT OF IRRIGATION PRACTICES ON LIVELIHOODS AMONG HOUSEHOLDS AND COMMUNITIES

Benefits to the Household

The study also tried to find out if irrigation had some direct contribution to households especially on some poverty indicators and the response is presented in table 3. The results indicate that irrigation practice influences these indicators as 289 representing 96.3% of respondents had mentioned its benefits in terms of food security, employment, income, wealth creation, increased spending, and improved health which contributes to the total wellbeing of individuals. The rest of the 3.7% did not respond at all to any of the responses. From the table, 66% agree that irrigation practice promotes food security to the households, 13% said it contributes to income generation, 7.3% said it contributes to employment, 7.3% improved health and only 0.7% said it supports wealth creation. Their responses are not different from the report of Lipton and Litchfield (2003).

Table 3: Benefits to the Household

Benefits to the household	Frequency	Percent	Cumulative Percent
Food security	198	66.0	68.5
Employment	22	7.3	76.1
Income	39	13.0	89.6
Wealth creation	2	0.7	90.3
Increase spending	3	1.0	91.3
Improve health	22	7.3	99.0
Other	3	1.0	100.0
Total	289	96.3	
Missing System	11	3.7	
Total	300	100.0	

Source: Field Data, 2011

BENEFITS TO THE COMMUNITY AND DISTRICT

Irrigation has direct and indirect impacts at different levels. At the micro-level the impact is on individuals and households and at the meso- level, it is on the community and the district. Tables 4 and 5 show responses from farmers contacted on how irrigation benefits the meso -level. For the community level, 53% of respondents said it contributes to food security being the highest percentage of respondents confirming their response even at the household level with the highest percentage response of 66% and with 57% responses on food security also at the district level.

Table 4: Benefits to the Community

Benefits to the community	Frequency	Percent
Employment	82	27.3
Food availability	160	53.3
Livestock production	15	5.0
Water for construction	24	8.0
Community asset building	6	2.0
Total	287	95.7
Missing System	13	4.3
Total	300	100.0

Table 5: Benefits to the District

Benefits to the district	Frequency	Percent
Food prices	27	9.0
Food export	25	8.3
Food security	172	57.3
Agro based enterprises	1	.3
Reduce migration	63	21.0
Total	288	96.0
Missing System	12	4.0
Total	300	100.0

Source: Field Data, 2011.

This is an indication that the first impact of irrigation on poverty is food security, at both the micro and meso- levels. At the district level respondent said irrigation practice reduces migration with 21% of respondents agreeing to that and 9% indicating that it influences food prices which the PSIA (2005) postulate that has a negative correlation on rural smallholder farmer’s income and a positive correlation on urban poverty and industrial growth.

CONCLUDING DISCUSSIONS

Small-scale irrigation schemes have a significant effect on food security, jobs, wages, wealth generation, increased spending, and improved health, all of which lead to individuals' overall well-being and poverty reduction in the Upper East region and the country as a whole. Food protection is a commonly documented effect of irrigation on hunger, as seen in the analysis at both the micro and meso- levels. During the dry season, small-scale irrigation in the Upper East area remains a major source of jobs by crop cultivation. Communities and farm families are encouraged to try to obtain households and collective irrigation sites through food for jobs, cooperative labor, and institutional funding because small-scale irrigation provides opportunities and revenue. During droughts and dry seasons, farmers augment their crop water supply with dams, dugouts, treadle

pumps, irrigation equipment, and flowing water from rivers. Irrigation is beneficial to the production of sustainable livelihoods among smallholder farmers and the reduction of poverty in the region, according to the report. The main policy consequence of these results is that African policymakers must develop strategic strategies that will boost investments in irrigation infrastructure to help support the continent's agenda to transform smallholder agriculture. Furthermore, the predominance of rain-fed farming, which leaves farmers idle for the majority of the year, combined with limited off-farm job prospects, exacerbates the farmers' income situation and access to resources such as schooling, health, and necessities. These partly explain the worsening poverty situation in the Upper East Region of Ghana in recent years.

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