



Vol. 7 | Social and development concerns in Africa (c)

Vol. 7 Article 7 | September 2019

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(An International Publisher for Academic and Scientific Resources)

SOCIO-ECONOMIC EFFECTS OF SMALL HOLDER IRRIGATION IN TANA DELTA IRRIGATION PROJECT –TANA RIVER COUNTY

Authors: ¹Alex Mwenda Kioko, ²Rev. Dr. Simon Njuguna and ³Teresia W. Ngugi
^{1,2&3}The Catholic University of Eastern Africa. P.O BOX 62157 00200

Nairobi, Kenya

Website: www.cuea.edu

Corresponding author: Alex Mwenda Kioko. Email: alexi.kiokom@gmail.com

Chief Editor

Web: www.ijsdc.org
Email: info@ijsdc.org

Editing Oversight

Impericals Consultants
International Limited

Abstract: *The purpose of this study was to establish the socio-economic effects of small holder irrigation in Tana Delta Irrigation Project in Tana River County. The study was guided by the following objective: to find out if the Tana Delta irrigation scheme has improved food security for the people in that area. The study used a descriptive research design which is under quantitative research approach. The target population comprised of all the households around Tana Delta Irrigation Scheme with a total of 2490. The study was based on the Freirean theory of dialogue and society and the resource dependency theories that have linkages with the involvement of people in sustainability of projects. The sample size was 10% of the population. The research used a structured questionnaire for data collection. Results from the study established that the irrigation had enabled the farmers to increase their yields as well as diversify their crops. However, the study revealed that food was not readily accessible to all households and that the food available was not adequate in quantity and quality. The study recommends that the government should allocate more funds to the TDIP so as to strengthen it and expand it more. It is recommended that the County Government of Tana River should allocate funds to improve the infrastructure in the area as will ease the accessibility of the farms and enable the households to get all the food they required to feed their family in time.*

Key Words: *Socio-economic, Irrigation, Food Security*

1.1 Study back ground

Throughout the world, irrigation is considered as a vehicle for agricultural and economic development. As a result, investments in irrigation have been accelerated in recent years. Smallholder irrigation has been promoted since the 1930s as a means of ensuring food security as well as improving the standard of living of the rural people. Smallholder irrigation development has shown throughout the developing world that it can be used as a key drought mitigation measure and as a vehicle for the long-term agricultural and macro-economic development of a country. Successful smallholder irrigation schemes can result in increased productivity, improved incomes and nutrition, employment creation, food security and drought relief savings for the government. However, socio-economic evaluations of smallholder irrigation schemes are needed at regular intervals in order to be able to derive lessons from past experiences and also help policy makers in formulating sound policies for future development (SAFR, 2000).

In the USA, the highest parts of the country which experience limited rainfall have higher water needs especially for irrigation purposes. In 2010, only five states accounted for 47% of national water use for irrigation. These are 68% in California, 95% in Arkansas, 66% in Texas, 91% in Nebraska and 90% in Idaho (www.americangeoscience.org).

In India, a correlation was drawn between irrigation development and poverty reduction. Irrigation development in India allowed for the adoption of agricultural technology that saw the use of fertilizers and pesticides that further enhanced irrigation production. The boost in agricultural technology led to rural economic development and decline in poverty levels (Dube, 2016).

In Africa, agriculture forms the backbone of most of the continent's economies, providing about 60% of all employment. Irrigation is a very old practice, dating back to the earliest civilizations of humankind. It served as one of the key drivers behind growth in agricultural productivity, increasing household income and alleviation of rural poverty, thereby highlighting the various ways that irrigation can impact poverty. To meet food requirements by 2020, the Food and Agriculture Organization for United Nations (FAO) estimated that food production from irrigated areas will need to increase from 35% in 1995 to 45% in 2020 (Mengistie & Kidane, 2016). In Africa, where irrigation levels are very low with only 3% of crops being produced under irrigation a paralleled slow pace in poverty alleviation has been experienced. World Bank (2001) postulated that Sub-Saharan Africa was worst affected by poverty with 47.7% and 46.3% of its population being reported poor in 1990 and 1998 respectively.

Researchers highlight that intensive crop production that is facilitated by irrigation schemes increases land productivity and output per unit area. Irrigation allows a certain degree of crop diversification that one cannot afford to achieve using rain-fed agriculture (Mwaba, 2013). Crop intensification in irrigated conditions enables households to cultivate during wet and dry seasons and, therefore, has a high land augmentation effect. Japan Bank for International Cooperation (2007) noted that the belief in the successes of irrigation schemes by the Zimbabwe government led to massive investment in irrigation and dam construction soon after independence. The aim of such investment in irrigation development was to reduce dependency on government, attain food security and foster rural development and alleviate poverty. In embracing the initiative, the government sought to bring communal farmers into the central economy and allow them to

participate in the main economic market so that they generate household income and community development.

According to studies carried out on rural irrigation schemes, there are conflicting conclusions with regard to benefits derived from them. Donor agencies such as FAO in (2006) pointed out to strong rural irrigation significance whereas others lampoon rural irrigation schemes as sheer waste. Despite the remarkable expansion of irrigated agriculture in Africa which brought dramatic increases in aggregate food production in the past three decades, there remain vast areas in the established rural irrigation schemes where productivity and incomes of farmers remain generally low and highly variable. This is attributed to a number of factors, including inequitable access to water, poor management, and a range of other physical, socio-cultural and economic constraints (Hussain & Wijerathna, 2004). In the face of increasing water scarcity caused by climate change, climate variability and ever increasing demand for food, many developing countries in the Sub-Saharan region are gearing up for major policy and institutional reforms to optimize the management of their water resources.

According to Dube (2012), the impact of rural irrigation schemes is a controversial issue as evidenced in countries such as Ethiopia and Zambia recently. Whilst there is empirical evidence that irrigation development has a substantial impact on livelihood security and poverty reduction, it's becoming increasingly clear that such impact is determined by the type of irrigation agriculture, scheme size, the type of operation and maintenance, the system of water allocation, among others.

Irrigation in Kenya has a long history spanning more than 40 years. According to the National Irrigation Board, irrigation has been practiced for many years along the lower River Tana and in Keiyo, Marakwet, West Pokot and Baringo regions. It has been noted that farmers around the world are quickly adopting irrigated agriculture as a guard against uncertainties such as the amount and distribution of rain. The Government of Kenya is implementing projects that will increase water storage per capita from 5m³ to 80m³ (16 times). This will support the country from perennial water shortage and the storage capacity will contribute to the growth of irrigated agriculture by 50,000 hectares. It is estimated that irrigation can increase agricultural productivity fourfold and, depending on crops, incomes can be multiplied 10 times. In addition to rain – fed agriculture, the Government has promoted irrigation farming for food and cash crops (www.nib.or.ke).

The Tana Delta Irrigation Project (TDIP) is located in Garsen Sub County, 110 km north of Malindi, Tana River County. The Tana River Delta and flood plain is estimated to comprise 200,000 Ha of land. Out of the 200,000 ha available, 100,000 Ha is considered suitable for commercial exploitation while the local communities reserve the remainder for conservation and use. The project is planned and dovetailed towards achieving the national development goals and in particular with respect to food security. The project area lies on the left bank of the river Tana from Sailoni in the north, where the TDIP intake is constructed. This is a rice scheme of 1800 Ha expandable to 4000 Ha. The project objectives include food security, creation of employment, generation of incomes for the local communities, generation of revenue from sale of the produce in the local and export market and the reduction of the rice import gap thereby saving on foreign exchange. The National Irrigation Board (NIB) was established and incorporated in 1966 as a state corporation through the Irrigation Act, Cap 347 of the Laws of Kenya to provide for the

development, control and improvement of irrigation schemes, for purposes incidental thereto and connected therewith (www.tarda.co.ke).

According to Gayathri, Priyanka and Bhavya (2017), socio-economic factors are characteristics that define the quality of life in a society. They influence the behaviors, attitudes, trends, tastes and lifestyles of individuals. In fact, the different class segments of the society - that is, upper class, middle class and lower class - are attributable to the socio-economic factors. The availability of disposable income influences spending habits. However, when income is scarce, customers tend to restrict their spending to essential items. Education equips members of the society with the skills and knowledge they require to be employed in different jobs and professions. The standards of education in society depend on the availability and accessibility of educational amenities. Education further determines the availability of skilled workforce when seeking employees for a small business. It is important to consider the implications of these socio-economic factors when developing a small business. Decisions made should be sensitive to the prevailing economic conditions when pricing and stocking the business as customers tend to avoid expensive items during periods of economic decline.

This study assessed the socio-economic impact of small holder irrigation schemes in the Tana Delta Irrigation Project. The study also aimed at proposing recommendations on how to increase the socio-economic impact of rural irrigation schemes on household and rural livelihood security. Through a socio-economic assessment of the Tana Delta irrigation scheme the study aimed to provide a framework for analyzing socio-economic effects of rural irrigation schemes and to review some evidence of these impacts. It was assumed that through this research the findings and recommendations could help in shaping future investment strategies in rural irrigation schemes.

1.2 Statement of the Problem

Across all of East Africa, farmers are facing the same problem. Persistent rural poverty and food insecurity have long been a fact of life here. Rapid population growth in sub-Saharan Africa's population is expected to double by 2050, the fastest rate of growth anywhere on earth, threatening to make those problems worse (McDonnell, 2016). With the issue of rural irrigation development to the fore, it is widely believed that irrigation schemes can play a pivotal role in rural development. However, no proper independent prognosis has been carried out to prove that irrigation schemes can act as a solution.

The main problems facing irrigation farming in Kenya is poor management and maintenance of the schemes and also the fact that most irrigation areas are set up in remote areas where roads and railways are not well developed (www.e-elimu.org). These issues need to be addressed for the sustainability of the irrigation scheme as a lot of money has been invested in rural irrigation schemes with the aim of eradicating hunger and dependence on food relief, reducing rural poverty and bring about socio economic stability. Since this irrigation programme was introduced in Kenya, the question that arose included whether these irrigation schemes were meeting the socio economic demands for which they were designed. This study therefore sought to evaluate the socio-economic effects of small holder irrigation development in Tana Delta irrigation project.

1.3 Objectives of the Study

The overall objective of this study was to assess the socio-economic effects of small holder

irrigation development in Tana Delta Irrigation Project whereas its specific objective was:

1. To find out if the Tana Delta irrigation scheme has improved food security for the people in Tana River County.

1.4 Justification of the Study

Scholars have carried out research on the impact of such investments for a better understanding of the smallholder irrigation sub sector. Questions have been raised about the viability of smallholder irrigation schemes especially on their financial viability, sustainability and on if the farmers are able to manage these projects. Other studies have also been done to establish if it is worthwhile to develop more schemes and also to find out if these projects are not inducing a financial burden on the government as far as operation and maintenance are concerned.

The study assessed how the Tana Delta irrigation scheme has improved the income levels of the farmers, created opportunities for employment and also establish how the farmers were managing the irrigation scheme projects, with a view to not only inform academic debate but also to inform government and the donor agencies who are the main actors in the Tana Delta Irrigation Scheme. In the wake of climate change and increased extreme weather patterns associated with it that was expected to affect the most vulnerable members of the third world countries. The study also examined the feasibility of using irrigation schemes as a buffer to boost food security related catastrophes such as droughts.

1.5 Literature review

Theoretical Framework

Freirean Theory of Dialogue and Society

This project was based on the Freirean theory of dialogue and society, and the major economics models of project assignment. The Paolo Freire's theory of dialogue (Freire, 1970) states that dialogue, particularly between leaders and community, is essential to liberation and education of the masses by challenging historically held methods via the use of critical thought. Critical thought raises consciousness and questions the assumption that people should fall into established routines or systems, rather than help to form new systems that better address their needs especially concerning projects intended to better their lives. This emphasis on conscious, collaborative action gives power to community members motivated to redefine aspects of their cognitive systems. Whether by negligence, lack of budget, lack of motivation, or simple ignorance, there are disparities in implementation of community based projects (Githinji, 2013).

Freire's emphasis on dialogue was reflected in this study by the researcher's advocacy for community involvement with the development and management of TDIP in order to ensure continuity of the irrigation schemes. This study was anchored on this theory and served as a bridge from the inaccessible and often intimidating language of development agencies to the people most affected by the discussion: communities.

Dependency Theory

The Resource Dependency Theory by Jeffrey Pfeffer and Gerald R. Salancik was developed in the 1970s. It looks at how the behavior of organizations is affected by external resources (Hillman et.

al., 2009). It argues that organizations have to try to minimize their dependency on other organizations for important resources and instead, influence the environment to make resources available (Daft et. al., 2013). This theory serves to inform projects on the needs to consider external factors that play a role in project success. These may include finances that are not within the community, and technical expertise among others. The attraction of these resources to the project is also dependent on level of community participation. The community also has to learn to make use the available resources among its people.

Empirical review

Food Security

Crush (2013) carried out a study on linking food security, migration and development in the Southern African context to establish the relationship between migration and development. The primary focus of the study was on urban food security and urbanization. The study sought to address possible reasons for the disconnect and then presented the implications for linking migration and food security. The results showed a consistent pattern of difference between urban migrant and non-migrant households in relation to levels of food insecurity, sources of income, food procurement strategies, and participation in urban agriculture.

In addition, Torero (2014) study noted that food security brings economic growth – not the other way round. The study aimed at increasing the understanding that food security strategy needed to be seen as more than a single sector issue; but requiring a combination of coordinated actions in various sectors like finance, agriculture, health and nutrition, infrastructure and others. The key findings were as the result of many years of research in different countries. The results shows that for a strategy to be based on food security, it was essential to change outdated mindsets aimed at economic growth that did not include food and nutrition security targets.. The study also established that food security not only carries significant benefits for human health, but also served as the basis to achieve sustained economic growth. The study recommended that achieving food security and reducing chronic malnutrition requires additional multi-sectoral policies aimed at reducing inequalities and targeting vulnerable populations. It also recommended that it was important to understand that investments geared toward achieving food and nutrition security must be integrated into the larger public policy debate, particularly in countries facing budgetary restrictions and obstacles to development on multiple fronts.

On top of this, Essex (2010) study on sustainability, food security and development aid after the food crisis assessed aid strategies across donor contexts. The study was to this concern by examining major national and multilateral development agencies' food crisis response, looking at how these institutions have articulated post-crisis strategic changes to development and food aid programs, and whether and how the concept of sustainability appears in these responses. The case studies selected were some of the major players within this agreement and who shape food aid strategies within the global aid architecture for the foreseeable future. The study results showed that in sum, sustainability after the global food crisis remains a shifting ground for combating hunger, poverty, and vulnerability, and a contentious and slippery concept to put into practice for food aid providers who work under widely diverging criteria and rubrics. The study recommended that closer attention to and integration of critiques leveled at both food system globalization and sustainable development, as articulated not only by aid experts and practitioners but by social movement groups representing and comprised of peasants and small farmers, could open the door

to a more useful engagement with sustainability as a basis for real reform of food aid and food provisioning.

1.6 Research Methodology

This study used a descriptive research design which was under quantitative research approach. A descriptive research design was used to gather data and information on the current state of phenomena without which was used to obtain information concerning the current status of a phenomenon as it was without any influences. In this research, the target population comprised of TDIP farm workers, TDIP office workers, village representatives and business men and women residing in Gamba village, Garsen Sub County consisting of 2,490 households. According to Johnson and Onwuegbuzie (2014), a sample should be above 10% of the total target population. The study therefore sampled 10% of the target population which resulted to 249 respondents. The study used stratified random sampling where the respondents were grouped according to what they do. Stratified random sampling was also preferred because it ensured each subgroup within the population received proper representation within the sample (Murphy, 2018). The study then used simple random sampling in each stratum to select the respondents. A structured questionnaire was used for data collection and Analysis of quantitative data included running of descriptive statistics such as frequencies and percentages and presented using tables, pie charts and bar graphs.

1.7 Study Findings

Food Security and Socio-Economic Impact

Increase of Yields

The research sought to established from the respondents whether their was an increase in yields due to the TDIP and the results are presented below.

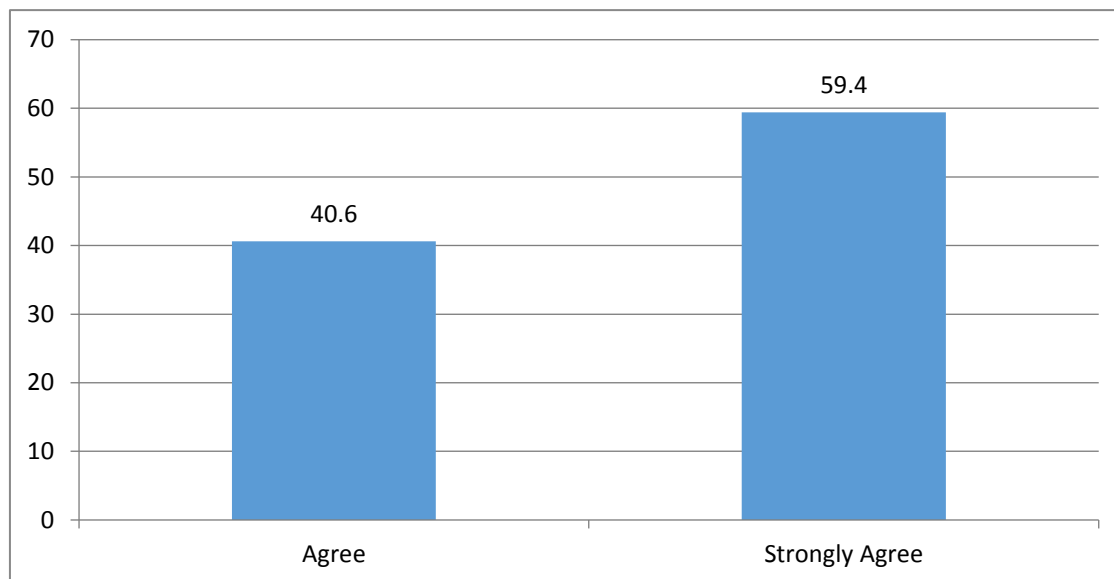


Figure 1: Increase of Yields

Source: *Field data, 2019*

Figure 1 shows that majority of the respondents (59.4%) strongly agreed that the irrigation had enabled the increase of yields while 40.6% of the respondents also agreed that the irrigation had enabled the increase of yields. None of the respondents disagreed that the irrigation had increased their yields. This shows that the TDIP has been instrumental in the food security of the region as farmers are able to get more produce thanks to the scheme. These results are linked to the dependency theory which shows that by communities considering external factors they are able to get better yields.

Diversification of Crops

The researcher further sought to find out whether the irrigation had enabled the diversification of crops and the results are presented below.

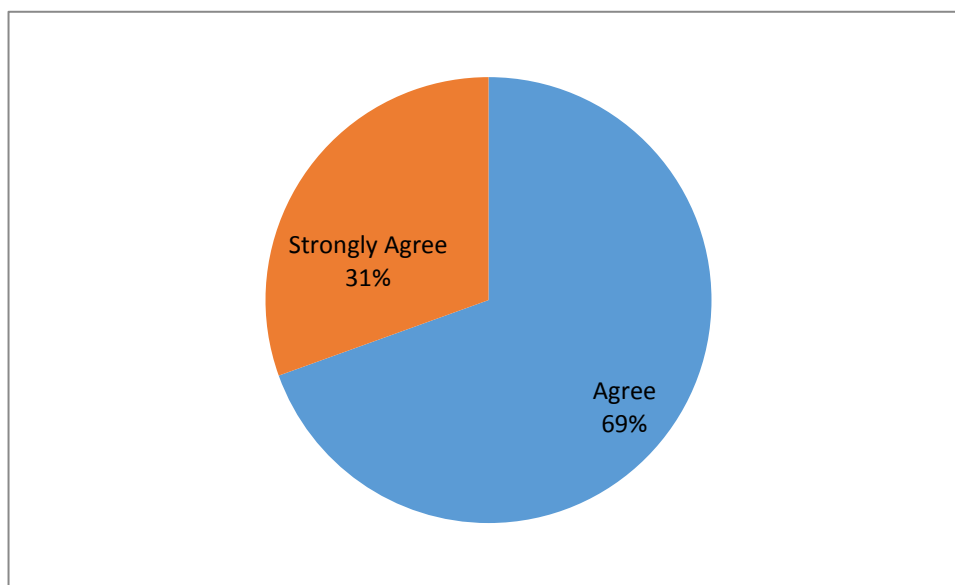


Figure 2 Diversification of Crops
Source: Field data, 2019

Figure 2 shows that majority of the respondents (69%) agreed that the irrigation had enabled the diversification of crops while 31% of the respondents strongly agreed that the irrigation had enabled the diversification of crops. None of the respondents disagreed that the irrigation had enabled the diversification of crops. These results show that the community has really benefited from the TDIP as they are able to plant various crops under the irrigation scheme and thus not depend on one food crop. This in turn increases their output and they are able to sell various crops that fetch them more income depending on their price in the market. According to the dependency theory the consideration of external factors play a role in project success as it enabled the respondents to diversify their crops.

Accessibility of Food by Households

Another aspect that the researcher was interested in was whether the TDIP had ensured that food is readily accessible to all households. Results are presented in Table 1.

Table 1: Accessibility of Food by Households

Category	Frequency	Percent
Disagree	104	41.8
Neutral	63	25.3
Agree	71	28.5
Strongly Agree	11	4.4
Total	249	100.0

Source: Field data, 2019

Table 1 shows that majority of the respondents (41.8%) disagreed that the food was readily accessible to all households while 28.5% agreed that the food was readily accessible to all households. 25.3% of the respondents neither agreed nor disagreed that food was readily accessible to all households while 4.4% of the respondents strongly agreed that food was readily accessible to all households. This results show that despite an increase in yields and the diversification of crops, food was not easily accessible to households. This could be because of the poor infrastructure in the region that limited easy accessibility to all the areas. It could also be due to the fact that the households have varied income levels and not all were able to afford the food that had been produced under the TDIP. These results are supported by the Freire’s theory which shows that inaccessibility of project managers can cause challenges in the management of a project which in turn can limit the production levels thus shortage of food.

Adequacy of Food in Quantity and Quality

The researcher was also interested in establishing whether the food available was adequate in quantity and quality. The results are shown below.

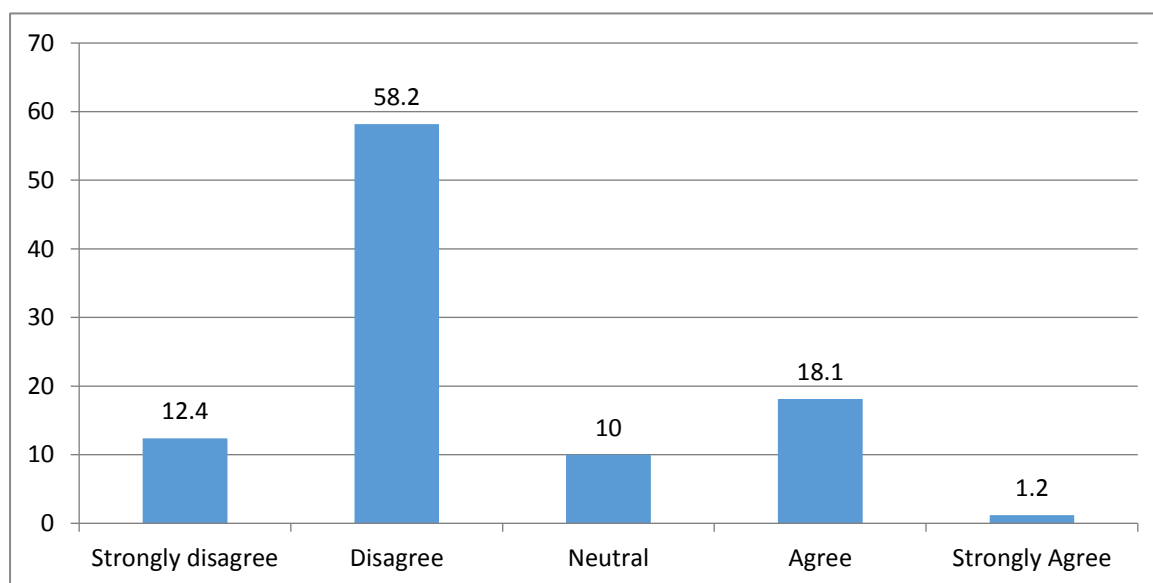


Figure 3: Adequacy of Food in Quantity and Quality**Source: Field data, 2019**

Figure 3 shows that majority of the respondents (58.2%) disagreed that the food available was adequate in quantity and quality while 18.1% of the respondents agreed that the food available was adequate in quantity and quality. This shows that majority of the respondents feel that despite having an increase in yields and diversified crops under the TDIP, more needs to be done to ensure that the food available is adequate in quantity and in quality. The inadequacy may be because most of the food produced under the TDIP is sold to various markets as the project was meant to be a food basket for the country thus the demand for the food is more than the supply. This shows that the TDIP should put into consideration the external factors as they can help them to limit the dependency on what they have and encourage them to consider other factors that can be of benefit to the community.

Availability of Food to Satisfy Family Needs

The researcher further sought to find out whether the available food may continuously satisfy the needs of families. The results are presented below.

Table 2: Availability of Food to Satisfy Family Needs

Category	Frequency	Percent
Strongly disagree	43	17.3
Disagree	116	46.6
Neutral	44	17.7
Agree	46	18.5
Total	249	100.0

Source: Field data, 2019

Table 2 shows that majority of the respondents (46.6%) disagreed that the available food may continuously satisfy the needs of families while 17.3% strongly disagreed that the available food may continuously satisfy the needs of families. 18.5% of the respondents agreed that the food available may continuously satisfy the needs of families while 17.7% neither agreed nor disagreed with the statement. This shows that a vast majority feel that despite the increase in yields, the food available is not enough and the TDIP can be expanded to produce more food for the households and the country at large. According to the Freire's theory, the TDIP should improve their community involvement so as to motivate those living around the project to be involved in farming as this will in turn increase the yields and avail food when needed.

1.8 Conclusion

The study concluded that the respondents agreed that the irrigation had enabled an increase of yields and that the irrigation had enabled the diversification of crops. The respondents however disagreed that the food was readily accessible to all households. They further disagreed that the food available was adequate in quantity and quality. The respondents also disagreed that the available food may continuously satisfy the needs of families.

1.9 Recommendations

The study concluded that the food was not readily accessible to all households. It is recommended that the County Government of Tana River should allocate funds to improve the infrastructure in the area. This will ease the accessibility of the farms and enable the households to get all the food they required to feed their family in time. It was concluded that the food available was not adequate in quantity and quality. It is therefore recommended that the County Government should offer subsidized farming products like fertilizer and insecticides to the farmers so that they can boost the quality of their produce. This will in turn boost the quantity of the produce as they will not be at risk of diseases.

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