Timon, F / Afr.J.Bio.Sc. 6(5)(2024).10543-10562 **ISSN: 2663-2187**

https://doi.org/10.48047/AFJBS.6.5.2024.10543-10562

AfricanJournalofBiological Sciences

Socio-economic Influences on Water Management Practices among Dry Season Irrigated Vegetable Farmers in Jimeta, Adamawa State, Nigeria

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Article History
Volume 6, Issue 5, 2024
Received: 22 May 2024
Accepted: 03 Jun 2024
doi:*10.48047/AFJBS.6.5.2024.10543-10562*

Abstract

This study analyzed the socio-economic influence of water management practices employed by dry season irrigated vegetable farmers in Jimeta, Yola North local government area, Adamawa State, Nigeria in November 2021. The data for this study were obtained by purposive sampling of 100 farmers using structured questionnaires and descriptive analytical tools such as frequencies and tables were used. Results show that 81% of the farmers practice surface irrigation, while 19% practice manual irrigation method. Respondent farmers indicate that there has been an increase in yield output in using selected irrigation method 75% agreed to that while 25% said no. Irrigation interval or frequency shows 13% irrigate after 1day interval, 49% indicate 2days interval before the next irrigation and 38% irrigate after 3days interval. Respondent farmers 24% said they experienced low level of water from water source, while 76% said they never experienced such low level. Farmers, 23% said they conserve water by repairing leaks in irrigation systems, 21% said they acquired knowledge in crop water requirements. Adoption of soil moisture monitoring device or climate information to determine when to irrigate were 21%, while 21% adjust their operating parameters of irrigation systems under windy conditions. The socio economic characteristics of the respondent farmers show more males, the level of informal education is low and farmers are not owners of the farm. The higher the educational attainment of farmers the higher their tendency to adopt more efficient irrigation methods and it is the same with farmers sources of information which in the study were found to be through radio. The study shows farmers practices of irrigation is influenced by their education and sources of information, 62% irrigate plot in interval of 1day and 2days is not good for water management practices. Belonging to cooperative organization, will help farmers learn from each other's experience, the study shows this is lacking. Government should employ more extension workers, who will in turn teach farmers the best management practices required in irrigation water management in particular. There is the need for increase funding for dry season farming and the targeted farmers be direct beneficiaries of such interventions.

Keywords

Water management, Socio-economic characteristics, Irrigation, Vegetable farmers.

Introduction

Water management is central to any meaningful agricultural production; hence its management is critical for sustainable agricultural enterprise. How farmers view water as a resource reflects how they handle it. If they see it as a 'free gift from God' that will always be there, irrespective of how it's been use, will portend a problem, as it is being experience as a result of climate change in many parts of the world. There have been instances of shrinking and drying of water bodies that before supply water for irrigation and people have now turned to underground water for irrigation in many areas around the globe. Whatever the source of water, be it surface or ground water farmers should see it as a finite resource and has to be managed properly for optimum and sustainable production.

Agricultural fresh water consumption withdrawn globally accounts for about 70% per year (UNESCO 2001). It therefore indicates that water channeled for agricultural purposes outweighs the ones used for domestic and other purposes. Agriculture is usually seen as the main factor behind the increasing scarcity of freshwater, and more to that the effect of climate changes further exacerbate the problem. With increasing world population expected to reach 9.7 billion by 2050 (FAO, 2016), more pressure will be exerted on water demand for agriculture to meet the increase food, fibre, and fuel demand across the globe. The agricultural sector is responsible for producing food, are also seen as managers of our natural resources for efficient use and sustainable continuous use of such finite resource (Pimental*et al*., 2004). The sector is being viewed as the safety valve for effective and efficient water management.

Farmers in developing countries who are mostly smallholder ones, and engages in subsistence farming, but whose cumulative agricultural activities feeds the rising population occupies a place in solving water management problems. Water for agricultural production should be viewed as how much of water per litreis required to produce a crop. It means every drop of water counts. However, this seems not to be the case, as farmers channel irrigation water for their production possibly not taking into cognizance the management practices which are critical for using water resources, and sees water as a free gift; hence it can be used anyway. Farmers socio economic characteristics have been found to be a major obstacle to achieving some agricultural innovations in many previous studies, it is in the light of this that this study tries to look at the socio-

economic influences on water management practices among dry season irrigated vegetable farmers.

Objectives

To investigate the socio-economic characteristics of the vegetable farmers in relation to their water management practices.

Materials and methods

Study area

The study area is Jimeta in Yola North local government area of Adamawa State. The Irrigation site is situated at the North Western part of Jimeta-Yola, North Eastern Nigeria. It lies between longitude 12^0 and 12^0 $28^/$ east of Greenwich and latitude 9^0 16^1 and 9^0 $19^/$ North of the equator. The area is between 150 and 180 meters above sea level. The coordinates for the precise study is 12.457256, 9.286793 and 12.425927, 9.309749. The soil type in the study area is variable. Along the Benue River Valley, which coincides with the local and regional discharge area, they consist of alluvial deposits made up of fine sands, silts, clay-shales and mudrock. To the northeast and southwest, which probably constitute the recharge area, the soil type ranges from deep porous brown soils to weathered red earth and coarse acid sands. They are thus relatively porous and permeable which encourages infiltration (Obeifuna&Orazulike, 2010). It is bounded in North East by River Benue, Rumde- Jimeta in the South West and Namtari Forest Reserve on the West. Jimeta-Yola is the seat of government of Adamawa state with a population of 247,892 according to the 2006 census. It is has the largest population in the state and vegetable farmers are strategic to the supply of vegetables to Jimeta markets.

Figure 1. Map of sampling site.

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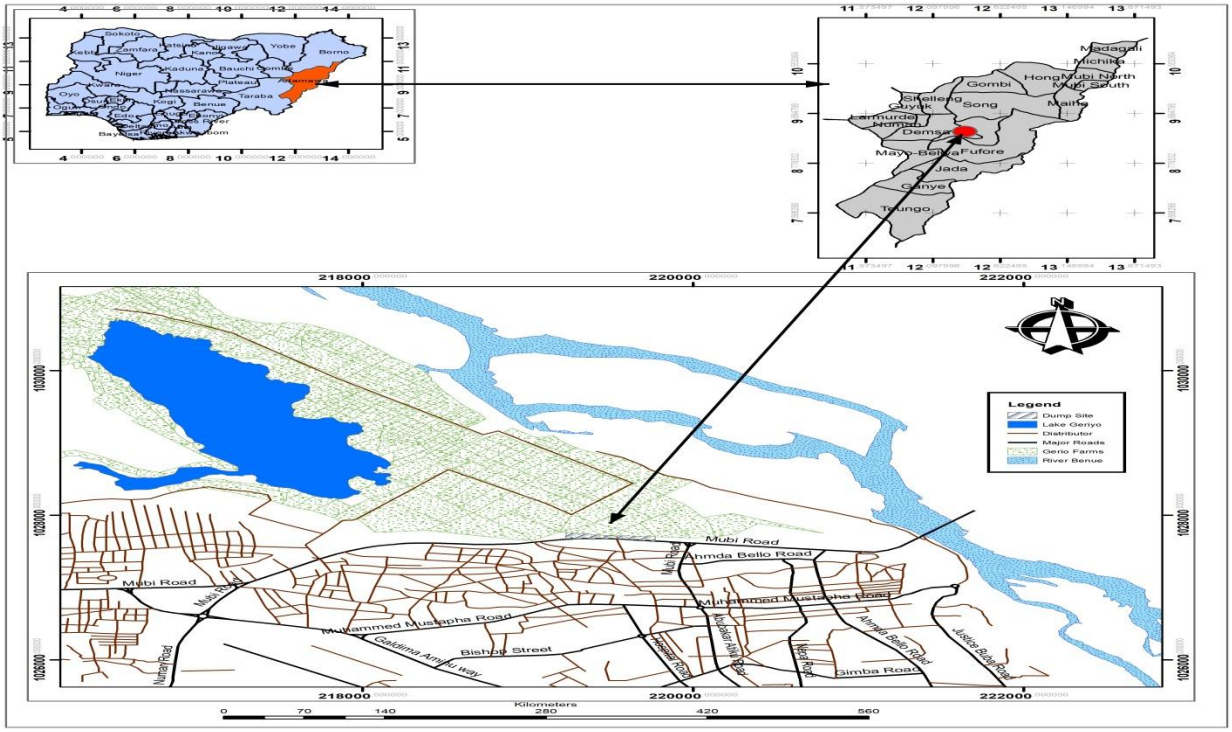


Sampling

The number of populations is above 600 farmers according to some leaders in the area. The exact number could not be ascertained due to lack of proper coordination of farmers in the area. One hundred (100) dry season vegetable irrigated farmers were randomly sampled along the River Benue Bank in Jimeta, Yola in November, 2021, using purposive or judgement sampling methods from the study area to determine their knowledge and management practices of irrigation water, using structured questionnaires which were administered and 100 were retrieved from respondent after administering them. Descriptive analytical tools such as frequencies, tables and bar charts were used to analyze the data. Findings were further critically analyzed using categorical or nominal data interpreted to ascertain the accuracy of the results. The research findings from the study informed the recommendations and providing tools to government and other critical stakeholders in the agriculturalsector as to the way forward.

Results and discussions

Water management practices among the farmers

This deals with the presentation and analysis of the data obtained through administered questionnaires from selected dry season farmers. The presentation of results and discussion of findings were done in line with the study objectives. The study recorded of 100.0% response rate, by retrieved 100 out of 100 administered questionnaires.

Table 1**Irrigation methods employ by farmers**

Options	**Frequency**	**percent**	**Cumulative percent**
Surface irrigation systems	81	81.0	81.0
Manual irrigation systems	19	19.0	100.0
Total	100	100.0	

Source: Field Survey 2021

Majority of the farmers 81% responded to using surface irrigation method to irrigate their farms, this method uses irrigation method wherein water is applied directly on the soil surface from a channel located on the upper side of the field. The water spreads over the fields by mechanism of gravity flow. Check basin irrigation is carried in which the whole field is divided into different small plots surrounded by bunds.Water from the main channel is supplied to the field channels one after another. This is because surface irrigation system can easily be adapted to flat topography and can function without outlets drainage facilities, it also work well with short term water supply. It further allows full utilization of rain water and can achieve high application efficiency when compared to manual irrigation system and others system of irrigation as responded by the farmers during the field survey conducted.

A great challenge for the agricultural sector is to produce more food from less water,particularly in arid and semi-arid regions which suffer from water scarcity (Hassanli et al.,2009).

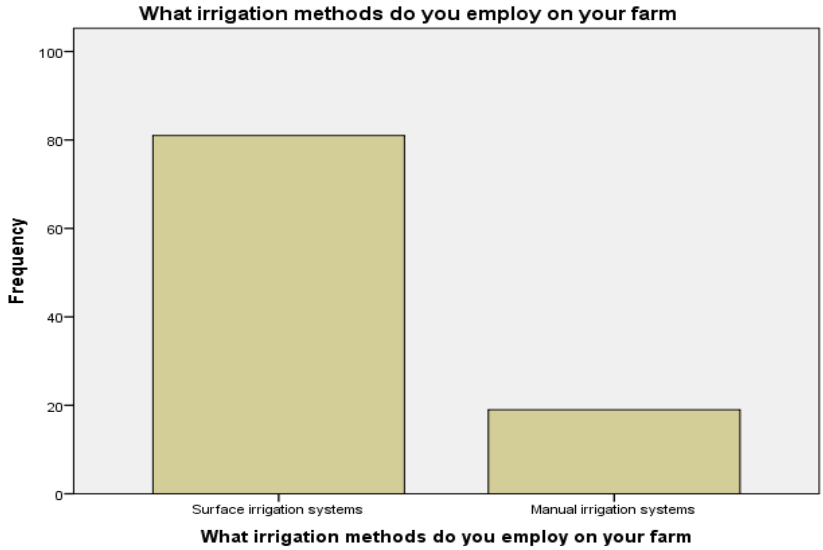


Table 2. **While using the selected system do you witnessed an increase yield in farm output?**

Options	**Frequency**	**percent**	**Cumulative percent**
Yes	75	75.0	75.0
No	25	25.0	100.0
Total	100	100.0	

Source: Field Survey 2021

Result on Table 2 showed the perception of the sampled irrigation farmers on the assertion that, whether the selected irrigation system increases yield on their farms. 75% responded “yes” that they witnessed increased yield in their output using the selected irrigation system, while 25% are of the opinion that they do not witnessed increased yield in the farm output. The result indicated that, majority of the farmers witnessed increase in their farm output as a result of the selected method use for irrigation system. Hassanli et al., made comparism with subsurface drip (SSD) and surface drip (SD) irrigation, and found out that the SSD gave more yield compared to the SD. The increase in yield here as perceived by respondents is subject for another research.

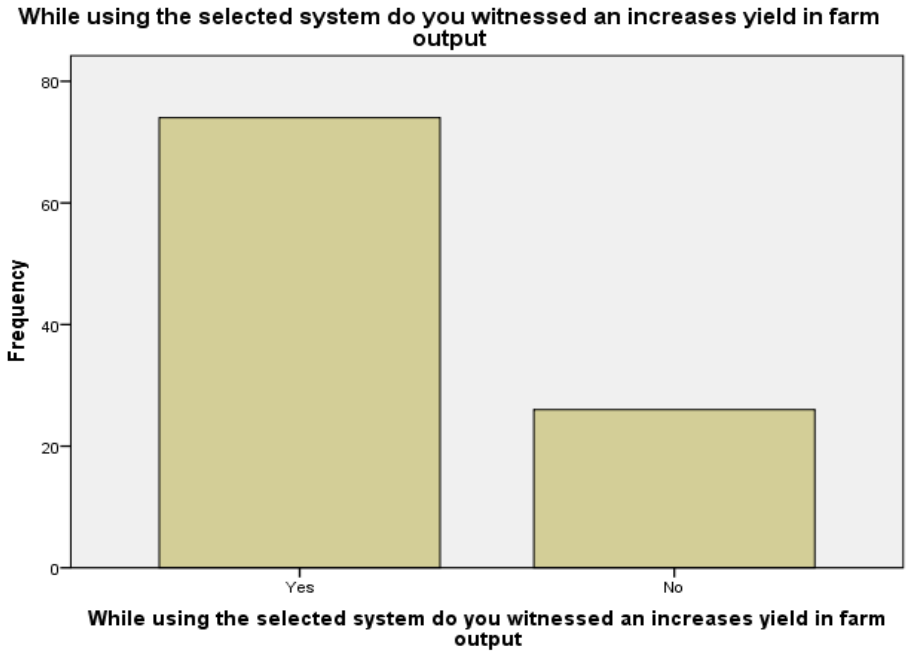


Table 3**irrigation interval you irrigate your farm land**

Options	Frequency	Percent	Cumulative percent
1 day interval	13	13.0	13.0
2 day interval	49	49.0	62.0
3 day interval	38	38.0	100.0
Total	100	100.0	

Source: Field Survey 2021

The result on Table 3 showed the respondents perception on the level of interval a farmer irrigate his farm in the study area. The result reveals that, 13% of the respondents agreed on 1 day interval, they do irrigate their farm, 49% are of the opinion that they do irrigates their farm at 2 days interval while 38% of the farmers say they do irrigate their farm at 3 days interval. The result shows majority of the farmers adopted 2 days interval method of irrigation in the studyarea, since majority of the farmers adopted the 2 days interval as the method of irrigation, this may be connected to the topography and the weather condition of the study area.Timon, F et al., 2018, worked on different levels of irrigation in rice, his findings reveals that higher yield were gotten in 3days interval, but the difference in yield with 6days interval was not much and the cost of irrigating is not worth expending. Amare & Abebe, 2020, indicates that the interval

for lettuce to be 2days interval It then indicates that the more the interval in irrigation the better all other things being equal, the soil texture, the rate of evaporation.

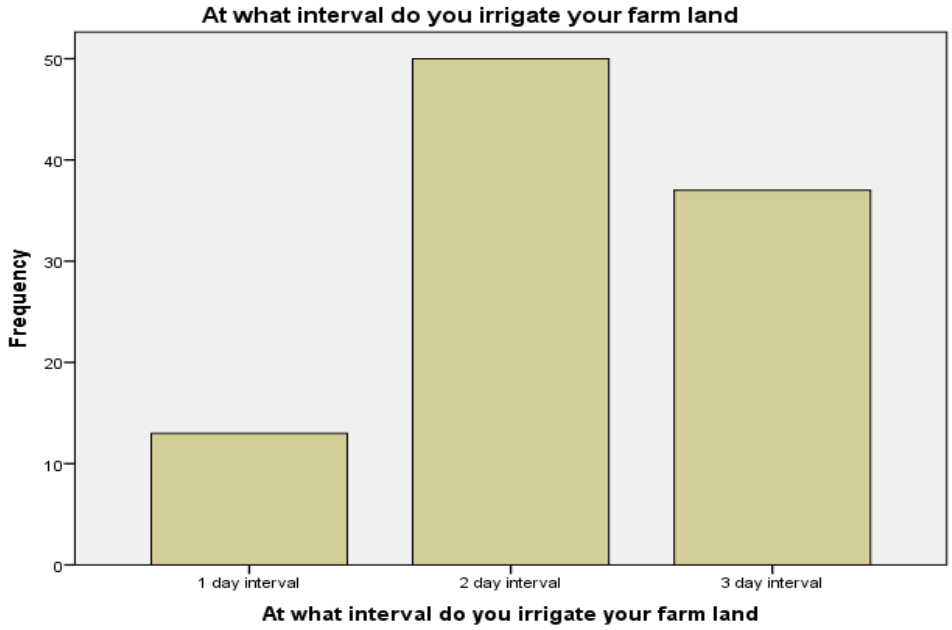
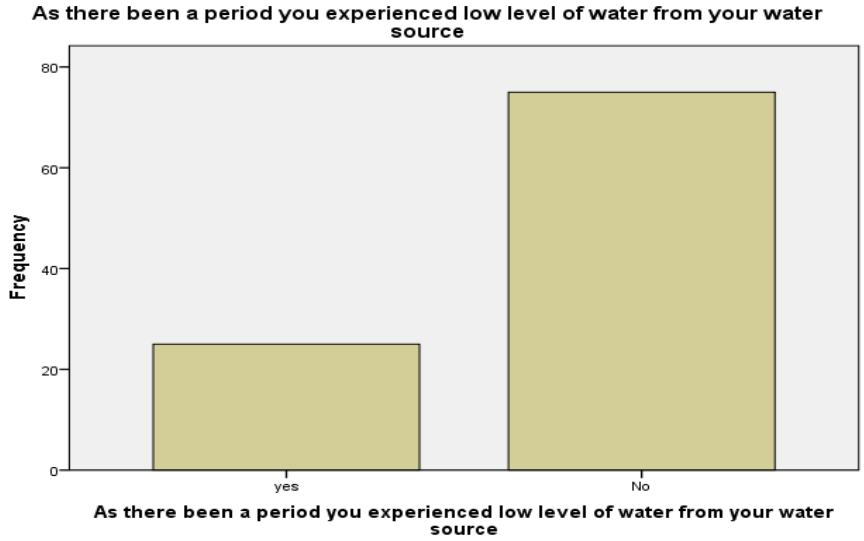


Table 4**has there been a period you experienced low level of water from your water source?**

Options	**Frequency**	**Percent**	**Cumulative percent**
Yes	24	24.0	24.0
No	76	76.0	100.0
Total	100	100.0	

Source: Field Survey 2021



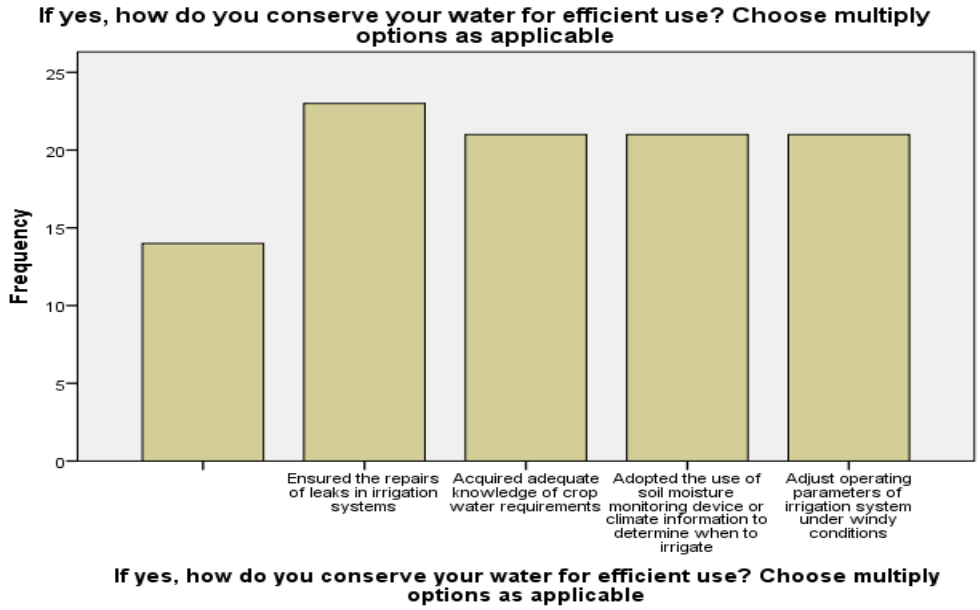
The result on Table 4 showed the period a respondent experience low level of water from their farm. The result showed that, 24% of the respondents are of the opinion that they do experience shortage of irrigation water, while 76% of the respondent responded "no" that they do not experience shortage of water during the farming period. The need to safe guard both surface and underground water is necessary due to the level of climate change, and its effect across the nations of the world with increasing population to feed.

Table 5**If yes, how do you conserve your water for efficient use? Choose multiply options as applicable**

Options	**Frequency**	**Percent**	**Cumulative percent**
Ensured the repairs of leaks in irrigation systems	23	23.0	23.0
Acquired adequate knowledge of crop water requirements	21	21.0	21.0
Adopted the use of soil moisture monitoring device or climate information to determine when to irrigate	21	21.0	21.0
Adjust operating parameters of irrigation system under windy conditions	21	21.0	21.0

Total	100	100.0	100.0

Source: Field survey, 2021



The result on Table 5 revealed the respondents perception on the farmer conserved water for efficient use during dry season farming in the study area. The result showed that 23% of the farmers are of the opinion that they ensured the repairs of leaks in irrigation systems for example the repairs of bunds, 21% of them acquired adequate knowledge of crop water requirements, also, 21% of the farmers responded that they adopt the use of soil moisture monitoring device or climate information to determine when to irrigate and 21% adjust their operating parameters of irrigation system under windy conditions in order block leakages for efficient use on their farm. The results indicated that, majority of the farmers adopt the repair of the leakage area during irrigation system.

Socio economic characteristics of the farmers in the area

The socio economic characteristics of the farmers in the studied area were captured in the tables and bars charts below.

Table1 Gender

Variable	Frequency	Percentage
Gender		
Male	86	86

Female	14	14
Total	100	100

The socio-economic characteristics of the respondents' farmers show that 86 percent of the farmers are males and 14 percent are females as shown in Table 1. The large percentage of males could be attributed to the culture where males have more access to land than their female's counterpart (Ogunmefun*et al*., 2015). It is believed that males are responsible for providing for their households, but the narrative is changing as more and more women are involved in agriculture and ownership of land as corroborated by Sheahan & Barrett, 2017, Livingston *et al*., 2011. Table 2 shows that 45 percent of the farmers' age is between the ages of 41 and 50 years, 17 percent are between the ages of 31-40, 15 percent of the farmers fall between the ages of 51-60, 13 percent of the farmers are above the age 0f 61 and those between the ages of 20-30 are 10 percent. This depicts a population of farmers that will be no more or will be affected by age in the no distant future(Szabo*et al.,* 2021, Zou *et al*., 2018, Guancheng *et al*., 2015). It is worthy to note that young farmers are needed to take over from their aging parent. They should be encouraged with incentives like low interest loans and other inputs to take up agriculture as a means of livelihood (Żmija*et al*., 2020, White, 2012). The current Covid-19 lockdown has further encouraged nations across the world to grow what they eat, Nigeria is not an exception. Recent policies by government in that direction are a welcome development, but young people should be in the vanguard of that agricultural revolution.

Table 2 Age

Variable	Frequency	Percentage
Age		
20-30	10	10
31-40	17	17
41-50	45	45
51-60	15	15
>61	13	13
Total	100	100

Table 3 shows that 70 percent of the farmers are married, while 19 percent of the respondents are singled and 11 percent are widowed. The respondents' family size Table 4 shows 44 percent of them have a family size of between 6 to 10 members while 28 percent of respondents have family size of 0 to 5 and also 28 percent have above 10 family members. The large family size could be attributed to the polygamous nature of the respondents.

Table 3 Marital status

Variable	Frequency	Percentage
Marital status		
Single	19	19
Married	70	70
Divorced	0	0
Widowed	11	11
Total	100	100

Table 4 Family size

Variable	Frequency	Percentage
Family size		
0-5	28	28
6-10	44	44
>10	28	28
Total	100	100

Majority of respondents farmers have non-formal education Table 5 shows that 40 percent of them fall within that category while 27 percent had attempted or finished primary or elementary education. From the foregoing, 19 percent had Secondary education and those who attended tertiary education level were 14 percent. Studies had revealed that the level of education has a direct correlation with the adoption of innovations (Zhang *et al*., 2019; Egwu, 2014; Yusuf *et al*., 2011). The more educated a respondent is, the better his disposition towards accepting improved technologies. From the results, the irrigation interval used by the farmers, 1day and 2days interval of 62%, is not good for water management, lot of the water is being wasted compared to 3days interval which is more sustainable and even at that needs to be further extended.

Table 5 Educational status

Variable	Frequency	Percentage
Educational status		
Non- formal	40	40
Primary	27	27
Secondary	19	19
Tertiary	14	14
Total	100	100

Respondents with 0 to 5 acres Table 6 form the largest farm sizes with 55 percent, while those with 6 to 10 and above 11acres followed with 30 and 15 percent respectively.This larger

percentage of 55 percent of between 0-5 acres could be attributed to small-scale farming of the farmers in the study area, which affirms the findings by Abbasy (2017). Farmer's farm size has a direct relationship with adoption of technologies. Farmers with larger portion of farm lands tend to easily adopt technologies that will ease, bring about better and sustainable yield. Years in irrigation farming Table 7 shows respondents with 25 years above in irrigation farming which form 43 percent, those with 15 to 24 years constitute 38 percent. Those with 6 to 14 years are 12 percent and 7 percent are those with less than 5 years.

Table 6 Farm size

Variable	Frequency	Percentage
Farm size		
0-5	55	55
6-10	30	30
>11	15	15
Total	100	100

Majority of farmers rent their farms Table 8 shows 85 percent of the respondents do not own the farms, while only 12 percent have the ownership of the farms. It also shows 2 percent of respondents that the farms belong to their relations and they don't rent, but in the overall the fall within the category of rent, though they don't pay anything for working the farms. Lack of farm ownership may affect the farmer in adopting technologies due to the reason that the land may be taken away from the user after investing much on the land.

Table 7 Years in irrigation farming

Variable	Frequency	Percentage
Years in irrigation farming		
<5	7	7
6-14	12	12
15-24	38	38
>25	43	43
Total	100	100

Table 8 Farm ownership

Variable	Frequency	Percentage
Farm ownership		
Own farm	12	12
Rent	85	85
Others specify	2	2

Total	100	100

Table 10 shows the respondents belonging to a cooperative group, where 57 percent of them show that they don't belong to a cooperative group while 43 percent indicated that they belong to a cooperative group. Belonging to a cooperative group is significant because it assumes that farmers gain or are able to have the information on improved technologies and other benefits that may come with coming together (Kumar *et al*., 2015, Benard*et al.*, 2013). The larger percentage that responded to not belonging to one, reveals that, they are been used as conduit for other people to enrich themselves. Their names are being used to access interventions, but they do not benefit from it and caused them to dissociate themselves from such cooperative organizations.

Table 10 Membership of a cooperative union

Variable	Frequency	Percentage
Membership of cooperative union		
Belong to a cooperative union	43	43
Do not belong to a cooperative union	57	57
Total	100	100

Table 15 shows the respondent's sources of information. 77 percent of the respondents have their source of information through the radio, 10 percent through television, 8 percent through friends and neighbours while 6 percent through extension agents. The respondents who get information through the social media were 2 percent. It then shows that the radio can be an effective tool to reach out to the farmers, from the study, few farmers 21% use to conserve water, 21% have acquired knowledge on crop water requirement, which is very low. Information channels for farmers like extension agents, is necessary to help farmers with practical knowledge for best water management approaches.Adio*et al*.,2016, indicates farmers in cooperative tend to increase their productivity, Caffaro*et al*., 2020, added to the role of information sources and intention to adoption of technologies. Nathitakarn, 2015 found farmers in adoption of organic vegetable farming is been affected by farmers perception of the characteristics of the new practice in comparison with the existing practice. Improved technologies should be compatible with farmer's acceptability, beliefs systems and also easy to use.

Table 15 Sources of information in irrigation water management

Variable	Frequency	Percentage
What is the major source of your information		
Radio	74	74
Television	10	10
Social media	2	0
Extension agents	6	6
Friends and Neighbours	8	8
Others	0	0
Total	100	100

Conclusions

Dry season irrigation agriculture in Nigeria is gaining more attention as the reliance on rain fed agriculture is becoming unreliable due to climate change and more energy is being put towards irrigation agriculture to meet up with demands for food, fibre and fuel. Irrigation water management practices should go hand in hand with increasing productivity, not only in terms of how much yield it gives, but how much water it utilize to give the yield increase. The method of irrigation used in the area is majorly the basin and border irrigation methods. The basin irrigation on one hand involves applying water to a nearly level field and may include ponding for extended time periods. On the other hand, with border irrigation, water flows between dikes that divide a sloping field into rectangular strips with free drainage at the end. The main purpose of the dikes is to contain water as it flows across the field, unlike basin irrigation where the dikes pond the water. Water is supplied to borders and basins from open ditches with gates, breaches or siphon tubes. These traditional methods of border are generally used for field and vegetable crops. These methods are associated with huge percolation losses resulting in low water use efficiency (WUE) and nutrient use efficiency (NUE). Water management practices using these traditional methods are increasingly becoming difficult in the changing climate scenarios. Though farmers strive to manage water use through their experience, they tend to apply more than the required amount of water. Farmers flood the basins, which in water saving management practices should be maintaining low water depths to avoid non-beneficial water use and less total water use, percolation and seepage.

The socio-economic characteristics of the respondent farmers show more males, level of formal education is low and farmers are not owners of the farms they farm on, the higher the educational qualification of farmers the higher their tendency to adopt more efficient irrigation methods. There is also a zero or low access to improved management practices and a negative attitudes towards the little that come across them.Farmer's sources of information were found to be through radio, this should be further encouraged and other avenues be looked into for example the use of extension agents. Government shouldemploy more extension workers, who will in turn teach farmers the best management practices required in irrigation water management in particular. There is the need for increase funding for dry season farming and the targeted farmers be direct beneficiaries of such interventions. The overlapping duties between the Ministry of Water Resources and Federal Ministry of Agriculture and Rural Development needs to be addressed. Additionally, farmers should be provided with loans and be encouraged to own their lands for easier adopting of technologies which if it is not, will be difficult to adopt in rented farms.

Acknowledgements

I am highly indebted to Prince of Songkla University, Hat Yai Campus, Faculty of Natural Resources and in particular the Tropical Agricultural Resources Department for the support.

References

Abbasy, MMS (2017). Farmers' knowledge, Attitudes and Practices, and their Exposure to Pesticides Residue after Application on the Vegetable and Fruit Crops. Case Study of North of Delta, Egypt in Tijani, H,Tijani, B. A and Audu, A. (2018). Socio-economic Determinants of Vegetable Farmers' Awareness of Safety Measures in Pesticide Use in Jere Local Government Area, Borno State Nigeria. *Agosearch*Vol. 18(1),pp.66-76

Amare, D. G., & Abebe, Z. K. (2020). Review on the Effect of Irrigation Interval on Different Crop Production. *International Journal of Plant & Soil Science*, 1-13.

Caffaro, F., Cremasco, M. M., Roccato, M., & Cavallo, E. (2020). Drivers of farmers' intention to adopt technological innovations in Italy: The role of information sources, perceived usefulness, and perceived ease of use. *Journal of Rural Studies*, *76*, 264-271.

Egwu, Emeka Williams. 2016. Factors affecting farmers' adoption of agricultural innovation in Delta State. *Global Journal of Agricultural Economics, Extension and Rural Development*. 3(2):177-182.

FAO. (2016). *the State of World Fisheries and Aquaculture*.

https://doi.org/10.5860/CHOICE.50-5350.

Guancheng Guo, Qiyu Wen, Jingjuan Zhu (2015). The Impact of Aging Agricultural Labor on Farmland Output: From the Perspective of Farmer Prefernces, *Hindawi Pblishing Corporation. Mathematical Problems in Engineering Volume 2015, Article ID730618, 7 pages. http//dx.doi.prg/10.1155/2015/730618*

HassanliMorad Ali, Ebrahimizadeh Ali Mohammed, Beecham Simon: The effects of irrigation methods with effluent and irrigation scheduling on water use efficiency and corn yields in an and region VL - 96 DO - 10.1016/j.agwat.2008.07.004 JO - *Agricultural Water Management ER* -)

Kumar, V., Wankhede, K. G., & Gena, H. C. (2015). Role of cooperatives in improving livelihood of farmers on sustainable basis. *American journal of educational research*, *3*(10), 1258-1266.

Pimentel, D., Berger, B., Filiberto, D., Newton, M., Wolfe, B., Karabinakis, E., … Nandagopal, S. (2004). Water Resources: *Agricultural and Environmental Issues*. *BioScience*, *54*(10), 909–918. https://doi.org/10.1641/0006-3568(2004)054[0909:WRAAEI]2.0.CO;2

Nathitakarn Pinthukas. (2015). Farmers' Perception and Adaptation in Organic Vegetable Production for Sustainable Livelihood in Chiang Mai Province. *Agriculture and Agricultural Science Procedia.* 5:46-51

Ogunmefun S.O., Achike A.I. (2015). Socio-economic Characteristics of Rural Farmers and Problems Associated with the use of Informal Insurance Measures in Odogbolu Local Government Area, Ogun State, Nigeria. *RJOAS* 2(38)

Szabo, S., Apipoonyanon, C., Pramanik, M., Tsusaka, T. W., & Leeson, K. (2021). Agricultural productivity, aging farming workforce, sustainable agriculture, and well-being: household survey data from Central Thailand. *Frontiers in Sustainable Food Systems*, *5*, 728120.

Timon, F., Alhassan, I., Maunde, M.M. and Simon, N.J., 2018. Irrigation Water Productivity of Rice under Various Irrigation Schedules and Tillage Practices in Northern Guinea Savanna Region of Nigeria. Trends Journal of Sciences Research, 2(3), pp.110-116.

United Nations Educational, Scientific and Cultural Organization[UNESCO]. 2001. Managing Risks: World Water Assessment Programme. Paris: UNESCO.

Yusuf H.A., Omokore, D.F., Akinola, M.O. and Omolehin, R.A.(2011). Socio-economic characteristics influencing farm household participation in gandu system in Charanchi Local Government Area of Katsina State, Nigeria. *Journal of Agricultural Extension and Rural Development* Vol. 3(12), pp.220-223, November 2011.

Zhang Biao, FU Zatian, Wang Jieqiong, Zhang Lixion. 2019. Farmers' adoption of water saving irrigation technology alleviate water scarcity in metropolis suburb. A case study of Beijing, China. *Journal Agricultural Water Management*. 212:349-357.

Zou, B., Mishra, A. K., & Luo, B. (2018). Aging population, farm succession, and farmland usage: Evidence from rural China. *Land Use Policy*, *77*, 437-445.

Adendum


JAPAN QUALITY
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