

# Economic Analysis of Marketing Beetroot Bulbs in Kaduna Metropolis, Kaduna State, Nigeria

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**Abstract:** Beetroot is one of the highly nutritious vegetable that provides health benefits to the people. The consumption of beetroot is on the increase because it has become a part of the diet of the populace due to the westernization of the diet of the Nigerian people, therefore there is need to conduct research on the economic analysis of its marketing. The study analyses the economics of beetroot bulbs marketing in Kaduna Metropolis. Multi stage sampling techniques was employed for the study. Three major markets were purposively selected from where 90 respondents were randomly picked. Data were collected with well structure questionnaires and analysed with descriptive statistics, costs and return, and financial analysis such as gross ratio, operating ratio and return per capital invested. The results showed that both male (62.22%) and female (37.78%) are involved in beetroot bulbs marketing in the study area, with highest age range of 21-30 (46.67%), married (77.78%) with household size of 6-10 persons (42.22%) and educated with primary, secondary and tertiary education (81.12%). The result of costs and return revealed that the marketing of beetroot bulbs is profitable with a net profit of ₦ 47,686.08 per respondents per month. The financial indicators revealed that the business is viable and worthwhile to embark upon. The study further showed that inadequate capita (16.88%), storage losses (15.83%), high transport charges (13.12%), poor road network (11.46%), inadequate storage facilities (10.83%), and price fluctuation (10%) were the constraints of beetroot marketing. The study concluded that beetroot marketing is a profitable and viable business which can serve as a source of living to the teeming unemployed youths in the study area.

**Keywords:** Beetroot Bulbs, Marketing, Profitable, Kaduna Metropolis, Nigeria

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## 1. Introduction

Cultivation of vegetables plays an important role in the prosperity of a nation. The production and consumption of vegetable promotes the health, happiness and welfare of the people in a nation. It has many important functions in peoples' everyday life. Being nutritional benefit and of short duration. Beetroot originated from *Beta vulgaris* L. ssp. Maritima by hybridization with *B. patula*. The crop probably originated from Europe. Earlier types were with long roots like that of carrot. Beet root, sugar beet and palak belong to species *B. vulgaris* and cross compatible. Beetroot is the bulbous tap root of a plant known as beet, which is among one of the several cultivated varieties of *Beta vulgaris*. The red beetroot (*Beta vulgaris* L. var. *vulgaris*) is a traditional and popular vegetable in many parts of the world. It is especially rich in fiber as well as in sugars, but has a

moderate caloric value.

The root of the beet plant tastes sweet and the leaves have a bitter taste. Beetroot has a thin rough outer skin. Inside it looks a little bit like an onion – a very red or purplish onion. Some varieties are also white or golden in colour. *Beta vulgaris* is not a popularly consumed vegetable in Nigeria but recently, it has become a part of the diet of the populace due to the westernization of the diet of the Nigerian people. The plant is commonly grown in Jos, Northern Nigeria. Though not an indigenous plant, it is however gradually being introduced as a component of salad and as constituents of some fruit drinks. The bulbous root is peeled, boiled and used in salads to give a reddish colour or mixed with other root vegetables and eaten with stew [21]. Beetroots can be used either alone, mixed to make a vegetable salad, cold as a

condiment or warm incorporating butter as a delicacy. They can be consumed raw, boiled or roasted [11].

The main benefits of beetroots are that it contains no fat, very few calories and is a great source of fiber. It is a rich source of protein (1.79/100), carbohydrates (88mg), calcium (200mg) phosphorus (55mg) and vitamin A (2100 I. U.) Thiamine (110 u.g) and ascorbic acid (50 mg / 100gm) [20]. It contains vitamin and minerals such as folate B9 that is significant for cellular function and normal tissue growth. It is highly beneficial for pregnant women [9]. Manganese is an essential trace element and a good anti-oxidant [14]. Potassium functions as a reducing agent for blood pressure levels as well as has a positive impact on cardiovascular health [8]. Iron is also another essential mineral that is required for transportation of oxygen in the red blood cell. Vitamin C serves as an antioxidant that is needed for immune function as well as skin health [15]. It contain inorganic nitrate that is converted to nitric oxide and is important for physiological intercellular messenger and cytotoxic infector molecules [15].

The tender leaves of young plant of beetroots are also used as pot herbs, historically; beet has been used as a medicinal plant touted as a cure or treatment for various diseases. More recently, the root has been used to treat various ailments including high blood pressure, erectile dysfunction (weak erection), sexual weakness, reduced and stabilize blood pressure in hypertensive patients, and in reducing instances of cardiovascular diseases [10]. Sports endurance performance has also been found to improve with dietary nitrogen supplementation that is found in beetroots [23]. In addition to the root, the leaves of the beet plant are also packed with nutrients and have been used in the treatment of a wide variety of diseases. It is also known to be beneficial for many other health conditions hence it being referred to as a “super food”. Because of its distinct reddish or purplish/pink colour, beet has also found applications in other industries like the food industry where it is used for food colouring.

In Nigeria, beetroot is not a popular vegetable, but it can be found in vegetable and salad markets across Nigeria, especially common in Jos, Plateau State and other Northern Areas. The common name is beet but it may also have other names in local languages like Igbo, Hausa or Yoruba but we don't have the names in those languages yet. Since the vegetable (beet root) is found in Northern areas especially Kaduna state and very little or no information is available about it marketing, the study seek to carry out economic analysis of beet root bulb marketing in Kaduna Metropolis. The specific objectives are to:

1. describe the socio-economic characteristics of beetroot marketers in the study area.
2. determine the costs and return of beetroot marketing in the study area.
3. evaluate the financial position and strength of the beet root marketing business.
4. identify the constraints facing beetroot marketing in the study area.

## 2. Methodology

### 2.1. Study Area

The study was carried out in Kaduna Metropolis, a city of Northern part of Nigeria and capital of Kaduna State. The Present-day Kaduna Metropolis consists of two Local Government Areas i.e. Kaduna North and Kaduna South, and parts of two other Local Government Areas i.e. Chikun and Igabi. It is located about 100km north of the country's Federal Capital, Abuja. Kaduna is the capital of Kaduna State and the fourth largest city in the country. Kaduna State is located between Latitude 90°N and 120°N and Longitude 60°E and 90°E of the prime meridian with a land mass area of about 46,053Km<sup>2</sup> and estimated population of 6,066, 562 millions [17]. Kaduna State is bordered by Katsina and Kano State to the North; Bauchi to the East; Plateau to the South-East; and Niger to the West and Abuja to the South. The mean annual rainfall decreased from South to the North (1152mm to 1635mm). The rainy season usually commences in April in the Southern parts and June in the Northern part. The length of rainy season varies between 90 days in the North to 200 days in the south. Natural vegetation include; Sudan and Guinea Savannah Zones. The major city of Kaduna metropolis are; U/Rimi, Malali, Barnawa, Tudun Wada, Mando, Kawo, Central Market, Sabo and Abakpa. The settlement and the ethnic groups include Hausa, Fulani, Jaba, Gbagyi, Kataf, Bajju, Nimzom, Koro, etc. Maize, Sorghum, groundnut, cowpea, millet, ginger and soya beans are mostly grown in the State. However farming is becoming one of the major economic activities carried out by the people of the State.

### 2.2. Sampling Techniques and Sample Size

Multi stage sampling techniques was employed in the study. In the first stage, three (3) major beetroot markets were purposively selected from the study area and they are; Station market, Central market and Monday market. Second stage involved random selection of 30 beetroot marketers from each market. This gave a total sample size of 90 respondents.

### 2.3. Methods of Data Collection

Structured questionnaires were used to collect data from the respondents. The questionnaires were structured in line with the objectives of the study and administered by personal interview.

### 2.4. Method of Data Analysis

Descriptive statistics which include mean, percentages and frequency- distribution were used to analyse specific objective one (i) and three (iii). This tool of analysis was employed to have summary characteristics and descriptions of the data that were collected. Costs and return analysis was used to determine the costs and return accrued to beet root bulbs marketing as adopted by [1, 5, 6] and [14]. The model of costs and return analysis is presented thus:

$$ATMC = AVC + AFC$$

where ATMC= Average total marketing cost (₦)

AVC= Average variable cost of marketing (₦)

AFC= Average fixed cost of marketing (₦)

The fixed assets of marketing such as knives, bowl, wheelbarrow, baskets etc were depreciated with straight line method to obtain the fixed assets cost. It was computed as:

$$D = OC - SV / N$$

Where D= Annual depreciation of fixed assets (₦), OC= Original cost of the fixed assets (₦)

SV= Salvage value or scrap value of the fixed assets (₦) and N= Year expectancy of the fixed assets.

Gross income was obtained by multiplying the quantity of beetroot sold in bag by the selling price per bag of beetroot. This is mathematically represented as

$$GI = Q_{bt} * P_{b_{bt}}$$

Where GI= Gross income (₦),  $Q_{bt}$  = Quantity of beetroot sold (bags),  $P_{b_{bt}}$  = Average price per bag of beetroot (₦)

Net Marketing Profit (NMP) was obtained by removing the Average Total Marketing Cost (ATMC) from the Gross Income (GI)

Financial analysis was used to assess the financial position and strength of the beet root marketing business. Gross ratio, operating ratio and return per capital invested were used following [19, 3] and [14]. Gross ratio is used to evaluate the overall financial success of the business. The lower or the smaller the value of gross ratio, then the higher the return per naira invested. The rule says a gross ratio less than one (<1) can be said to be desirable or good for any business. An operating ratio that is less than one (<1) in this case indicates that the total marketing income (Gross income) is able to offset the cost of variable input used in the marketing of beetroots [19, 3, 4]. The ratios are estimated as follows:

$$GR = TMC / GI$$

Where, GR= Gross Ratio (Unit), TMC= Total Marketing Cost (₦), GI= Gross Income (₦).

$$OR = TVC / GI$$

Where OR= Operating Ratio, TVC= Total Variable Cost of marketing (₦), GI= Gross Income (₦)

$$RNI = NMP / TMC$$

Where, RNI= Return per Naira Invested, NMP= Net Marketing Profit (₦), TMC= Total Marketing Cost (₦)

### 3. Results and Discussion

#### 3.1. Socio- Economic or Demographic Characteristics of Beetroot Marketers

The socio-economic or demographic characteristics of beetroot marketers considered on Table 1 are gender, age, marital status, household size, educational level and years of experience in beetroot marketing.

**Table 1.** Socio-economic or demographic characteristics of sampled beetroot marketers.

Variable	Frequency	Percentage
Gender		
Male	56	62.22
Female	34	37.78
Age		
10-20	5	5.56
21-30	42	46.67
31-40	30	33.33
41-50	12	13.33
Above 50	1	1.11
Marital status		
Single	12	13.33
Married	70	77.78
Divorced	4	4.44
Widow	3	3.33
Widower	1	1.11
Household size		
1-5	38	42.22
6-10	41	45.56
11-15	9	10.00
16-20	2	2.22
Educational level		
Primary education	24	26.67
Secondary education	24	26.67
Tertiary education	25	27.78
Quranic education	8	8.89
Adult education	6	6.65
Non-Formal education	3	3.33
Years of experience		
1-5	41	45.56
6-10	42	46.67
11-15	7	7.78
Access to credit facilities		
Yes	28	31.11
No	62	68.89

Source: Computed from field survey data, 2021

The table showed that 62.22% of the marketers are male and 37.78% are female. This result clearly indicated that male had the highest and are more involved in beetroot marketing than female in the study area. The result also agreed with the study of [7, 3] which stated that the cultural belief makes males in the Northern part of Nigeria to engage in outdoor economic activities, while the females are housewives and therefore stays indoor and participated in some micro enterprises. The age distribution of respondents revealed that 46.67% of the respondents had the highest age range of 21-30, 33.33% had 31- 40 age range while 13.33% of the respondents falls between 41-50 years. The least age range is found between 10-20 and above 50 years, representing 5.56% and 1.11% respectively. This implied that beetroot marketing in the study area are energetic and embraced mostly by middle- aged marketers between the ages of 21- 40 years. The age range of most marketers of vegetable are active and middle-aged dominated [22]. The marital status revealed that majority (77.78%) of beetroot marketers is married. This indicates that beetroot marketing in the area of study is common among couples; this enables them to make use of family labour. Married households tend to be more stable in the marketing of vegetables than the single individuals [13]. 13.33% are single

and 4.44% are divorced. The percentage of respondents that are widow and widower is put at 3.33% and 1.11% respectively. Table 1 also showed that 45.56% and 42.22% of the marketers had household size between 6-10, and 1-5 persons while 10.00% had between 11-15 members. The least household size (2.22%) is found between 16-20 members. This showed that more than half (55.56%) of the marketers had household size between 6- 15 persons. This further indicated that the beetroot marketers had moderate household size which can translate into family labour thereby reducing the marketing cost and thereby increasing the net marketing profit of the marketers. Education is very important and has positive effect on the ability of the marketers to make quick, accurate and intelligent judgement about people and situations. The table further showed that 81.12% of the marketers were educated with primary (26.67%), secondary (26.67%) and tertiary (27.78%) education. This implies that majority of the beetroot marketers are literate and had formal education. In terms of years of experience in beetroot marketing, 46.67% of the marketers had 6-10 years of experience in beetroot marketing, 45.56% had 1-5 years while only 7.78% had 11-15 years of experience. Experienced marketers are more conversant with the ways of tackling inherent problems associated with their marketing activities [12]. The result of access to credit facilities showed that 68.89% of the marketers do not have access to credit facilities while 31.11% had access to credit facilities. This suggests that majority of beetroot marketers in the study area could not adequately access and acquire credit facilities to enable them improve their marketing activities.

### 3.2. Average Costs and Return of Beetroot Marketing Per Respondents in Kaduna Metropolis

The average cost and return of beetroot marketing on Table 1 showed that the total marketing cost was ₦ 529,883.94 while the total variable cost formed ₦ 528,147.53 and total fixed cost of marketing was ₦ 1,736.41. Purchased cost formed the highest percentage (94.84%) of the variable cost followed by transportation cost (1.50%), rent cost (1.07%), labour cost (0.92%), cost of leather (0.85%), cost of rope (0.66%) and marketing charges (0.16%) respectively. In terms of the fixed cost, cost of wheel barrow (53.28%) represents the highest fixed cost of marketing while cost of bowl and knife had 29.71% and 17.01% respectively. The percentage of the total cost of marketing followed the same trend with that of variable cost, it was highest for purchase cost (94.52%). Transportation, rent, labour and cost of leather formed 1.50%, 1.07%, 0.91% and 0.85% of the total cost of marketing while bowl and knife had the lowest cost of 0.10% and 0.06% respectively. The total variable cost of marketing constituted the highest cost of total marketing cost, having 99.67%. This means increasing the total variable cost most especially purchase cost will increase the volume of beetroot bulbs marketing and consequently increase the net profit of marketing. The total fixed cost of marketing only had 0.33% of the total cost of marketing. The table further showed that total revenue of ₦ 577,570.02 was generated and net market profit of ₦ 47,686.08 was obtained per respondents per month. This showed that the marketing of beetroot bulbs was profitable in the study area.

**Table 2.** Average Costs and Return of Beetroot Marketing per Respondents in Kaduna Metropolis.

	Quantity (Bags)	Unit price	Gross income (₦)	Cost (₦)	% VC	% TMC
A. Gross Income						
Bags of beetroot	53.60	10,775.56	577,570.02			
B. Variable cost						
Purchase Cost	53.60	9,344.44		500,861.98	94.84	94.52
Transport				7,934	1.50	1.50
Labour (Loading and Offloading)				4,840.67	0.92	0.91
Rent				5,675	1.07	1.07
Marketing Charges				849.44	0.16	0.16
Rope				3,478.44	0.66	0.66
Leather				4,508	0.85	0.85
C. Total Variable cost				528,147.53	100	99.67
D. Fixed cost						
Knife				295.35	17.01	0.06
Bowl				515.87	29.71	0.10
Wheel Barrow				925.19	53.28	0.17
E. Total Fixed Cost				1,736.41	100	0.33
Total Marketing Cost (TMC)				529,883.94		100
Net Marketing Profit (NMP)				47,686.08		

Source: Computed from field survey data, 2021

### 3.3. Financial Analysis of Beetroot Bulbs Marketing

The financial position and strength of the beet root marketing business were determined with gross ratio, operating ratio and return per capital invested (Table 3). The table showed that the gross ratio was 0.92; this implies that 92% of the gross income of the beet root marketers went to

offset total marketing cost. The gross ratio measures or evaluate overall financial success of the beet root marketing business. It is expected that the lower the gross ratio, the higher the return per naira invested. The operating ratio gave a value of 0.91. This means that 91% of the gross income goes to cover the total variable cost. The return per capital or naira invested recorded a value of 0.09. This indicated that for every ₦ 1.00 invested in beet root marketing, ₦ 0.09 k

profits is generated.

**Table 3.** Financial Analysis of beetroot bulbs marketing.

S/N	Profitability measures	Ratios
1	Gross Ratio (GR)	0.92
2	Operating Ratio (OR)	0.91
3	Return per capital/ naira invested (RNI)	0.09

Source: Computed from field survey data, 2021

### 3.4. Constraints of Beetroots Marketing in the Study Area

Nine constraints were found associated with beetroots marketing in the study area. The constraints as presented on Table 4 are: inadequate storage facilities, seasonality, price fluctuation, inadequate capital, low price, poor road network, high transportation charges, high market commission charges and storage losses. Inadequate capital constituted the highest constraint with 16.88%. Storage losses had 15.83%, this could be attributed to inadequate storage facilities which has a value of 10.83%. High transport charges, poor road network and price fluctuation had 13.12%, 11.46% and 10% respectively. The study of analysis on costs and returns on groundnut enterprise in Bekwarra L. G Area of Cross River State reported lack of storage facilities, high transportation cost and lack of market infrastructure as the major problems of marketing groundnuts [2]. Also, poor access road and high cost of transportation adds to the marketing cost of the respondents, which in turn affect the profitability and efficiency level of the respondents [18, 16]. In this study, low price and seasonality of the beetroots had 8.54% and 7.92% while high market commission charges had the least constraint of 5.42%. However, the study of economic analysis of beet root marketing in Pune District of India found price fluctuation (93.33%), lack of market intelligence (81.11%), high commission charges (78.89%), high grading cost (77.78%) and high transport cost (68.89%) as problems associated with beetroots marketing [20].

**Table 4.** Distribution of Respondents Based on Constraints of Beetroot Marketing.

Constraints	Frequency*	Percentage (%)
Inadequate storage facilities	52	10.83
Seasonality	38	7.92
Price fluctuation	48	10.00
Inadequate capital	81	16.88
Low Price	41	8.54
Poor road network	55	11.46
High transport charges	63	13.12
High market commission charges	26	5.42
Storage Losses	76	15.83
Total	480	100

Source: Computed from field survey data, 2021

\* Multiple responses

## 4. Conclusion

It can be concluded from the findings of the study that both male and female are involved in beetroot bulbs

marketing, age between 21-30 years, household size 6-10 members and educated with primary, secondary and tertiary education. Majority had 6-10 years of marketing experience and do not have access to credit facilities. The sale of beetroot bulbs is viable, worthwhile and profitable in the study area with net marketing profit of ₦ 47,686.08 per month and per respondent. It can further be concluded that inadequate capita, storage losses, high transport charges, poor road network, inadequate storage facilities and price fluctuation were the constraints of beetroot marketing in the study area.

## 5. Recommendations

Based on the findings of the study, the following recommendations are made:

1. The marketing of beetroot bulbs is profitable, therefore teeming youth and adults of the study area should be encouraged to go into the business to reduce the menace of unemployment.
2. The marketers should come together to form cooperative society where they can pool their resources together and obtain loan at lower interest rate to expand their business, also the commercial banks should make loans available to the beetroot bulbs marketers at lower rate of interest to finance and expand their business.
3. Storage facilities should be constructed and made available to the beetroot marketers, by the research institutes and Non- Governmental Organizations (NGOs), this will alleviate the problem of storage losses and inadequate storage facilities and minimizes losses incurred by the marketers in the business.
4. Bad road should be renovated and new one constructed by the government at all levels to easy the problem of transportation during beetroot marketing activities and also to reduce transportation cost.

## References

- [1] Adegeye, A. J. and Dittoh, J. S. (1985). *Essentials of Agricultural Economics*. Published by Impact Publisher Nigeria Ltd., Ibadan. Page 51.
- [2] Adeinye (2009) Analysis on costs and returns on groundnut enterprise in Bekwarra L. G Area of Cross River State, *Tropical and subtropical Agro ecosystems*, 8: 313-318.
- [3] Alabi, O. O. and Abdulazeez I. (2018). Economics of Maize (*Zea mays*) Production In Igabi Local Government Area, Kaduna State, Nigeria. *Journal of Agricultural Faculty of Gaziosmanpasa University* <http://ziraatdergi.gop.edu.tr/Araştırma>, 35 (3), 248-257 doi: 10.13002/jafag4434.
- [4] Ariyo, O. C. and Usman, M. B. (2020). Profitability Analysis of Fuel Wood Marketing in Igabi Local Government Area of Kaduna State, Nigeria. *Journal of Sustainable Environmental Management (JSEM)*, 12, 82-95. ISSN 2141-0267. [www.awife.org.ng/publications/jsem.html](http://www.awife.org.ng/publications/jsem.html)

- [5] Ariyo, O. C., Ariyo, M. O., Okelola, O. E., Omodona, S., Akesode, H. A., and Akanni, R. J. (2013a). Profitability Analysis of Plantain Marketing in Kaduna Metropolis, Kaduna State, Nigeria. *Journal of Agriculture and Social Research*, 13 (1), 21-30. Available online at [www.ajol.info/journals/jasr](http://www.ajol.info/journals/jasr)
- [6] Ariyo, O. C., Faleyi, O. I., and Ariyo, M. O. (2013b). Economic Analysis of Small Scale Forest-Based Mortar and Pestles Production in Kaduna Metropolis, Kaduna State, Nigeria. *Journal of Agricultural Research and Development*, 12 (1), 19-34. [www.ajol.com/index.php/jard](http://www.ajol.com/index.php/jard)
- [7] Bappa, A. A. (2008). Analysis of the Structure and Performance of Egg Marketing in Damaturu Metropolitan Area, Yobe State, Nigeria. A Project Submitted to the Department of Agricultural Economics and Extension, University of Maiduguri, Nigeria.
- [8] Carter, A. (2018). Potassium. Health Benefits and Recommended Intake. *Medical News Today*. Retrieved May 9, 2019, from <https://www.medicalnewstoday.com/articles/287212.php>
- [9] Ferguson, E., Chege, P., Kimiywe, J., Wiesmann, D., and Hotz, C. (2015). Zinc, Iron and Calcium are Major Limiting Nutrients in the Complimentary Diets of Rural Kenyan Children. *Maternal and Child Nutrition*, 11 (Suppl 3), 6.
- [10] George, T. W., Kaffa, N. and Lovegrove, J. A. (2010). Beetroot Juice Consumption Reduced Blood Pressure in Normotensive Individuals in an Acute Dose-Response Study. *Proceedings of the Nutritional Society*, 69 (OCE6). Retrieved October 4, 2018, from <https://www.cambridge.org/core/journals/proceedings-of-the-nutrition-society/article/beetroot-juice-consumption-reduced-blood-pressure-in-normotensive-individuals-in-an-acute-dose-response-study/A19D1E77261A0234C9D8EB6223EDFF4D>
- [11] Grace Ndunge (2019). Analysis of Beetroot Bulbs (*Beta vulgaris*) from selected Geographical regions in Kenya: Contents of Essential Nutritional Elements. A thesis submitted in partial fulfillment for the degree of MSc in Nuclear Science in the Institute of Nuclear Science and Technology in the University of Nairobi. pp 1-6.
- [12] Iheke R. O. (2010). —Migrant Remittances, Resource Use Efficiency and Welfare among Rural Smallholder Arable Crop Farm Households in South Eastern Nigeria. A PhD Dissertation Research; Department of Agricultural Economics, Michael Okpara University of Agriculture, Umudike, Nigeria.
- [13] Iheke, O. R. and Anonde, C. M. (2021). Economic Analysis on Bush Buck (*Gongronema latifolium*) Marketing In Udi Agricultural Zone Of Enugu State, Nigeria. In Idiong C. Idiong, Susana B. Ohen, Ekanem A. Etuk, John B. Effiong, Ideba E. Ele, Emmanuel O. Eyo, and Syvanus O. Abang (Eds.). *Agriculture and Economic Development: Strengthening the Nexus in a COVID-19 Era*. Proceeding of the 34th Annual Conference of Farm Management Association of Nigeria, University of Calabar, Calabar, Cross River State, Nigeria. November 15<sup>th</sup>-18<sup>th</sup>, 2021. pp. 802-811.
- [14] Institute of Medicine (US). (2001). Manganese. National Academic Press (US). Retrieved September 20, 2018, from <https://www.ncbi.nlm.nih.gov/books/NBK222332/>
- [15] Moat, S. J. (2018). Plasma Total Homocysteine: Instigator or Indicator of cardiovascular Disease? *Annals of Clinical Chemistry*, 45 (4), 345-348.
- [16] Njoku, M. E and Nnamani, N. G. (2016). Profitability and marketing efficiency of ware yam trading in Umuahia North Local Government Area of Abia State, Nigeria. *Scholars Journal of Economics, Business and Management*, 3 (2), 58-63.
- [17] NPC, (2006). National Population Commission of Nigeria (web), National Bureau of Statistics (web).
- [18] Oke, U. R., Simonyan, J. B. and Onwuegbu-Eric, C. A. (2021). Economics of Rice Marketing in Bende Local Government Area of Abia State, Nigeria. In Idiong C. Idiong, Susana B. Ohen, Ekanem A. Etuk, John B. Effiong, Ideba E. Ele, Emmanuel O. Eyo, and Syvanus O. Abang (Eds.). *Agriculture and Economic Development: Strengthening the Nexus in a COVID-19 Era*. Proceeding of the 34th Annual Conference of Farm Management Association of Nigeria, University of Calabar, Calabar, Cross River State, Nigeria. November 15<sup>th</sup>-18<sup>th</sup>, 2021. pp. 703-710.
- [19] Olukosi, J. O and Erhabor, P. O (2005). Introduction to Farm Management Economics: Principles and Applications, Agitab Publishers Zaria, Nigeria.
- [20] Pokharkar, S. V., Perake, D. S. and VG Pokharkar (2020). Economic analysis of beet root marketing in Pune District. *Journal of Pharmacognosy and Phytochemistry* 2020; 9 (2): 819-822.
- [21] Wotton-Beard, P. C., Brandt, Fell, D., Warner, S. and Ryan, L. (2011). Effect of a beet root juice with high neobetainin content on the early-phase insulin response in healthy volunteers. *Journal of nutrition science*, 3: 1-9.
- [22] Yohanes, M. (2015). Performance and challenges of vegetable market: The case of Kombolcha District - East Harerghe Zone –Oromia National Regional State –Ethiopia, MSc thesis, School of Agricultural Economics and Agribusiness, Hamaraya University, Ethiopia, 2015.
- [23] Zafeiridis, A. (2014). The effects of dietary nitrate (beetroot juice) supplementation on exercise performance. A review, *Am J Sport Sci*, 2, 97-110.