

Economic Analysis of Replacing Imported Cabbage with Locally
Produced Garden Egg Fruit for Salad Preparation in Ekiti State,
Nigeria.

BY

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DEDICATION

This research work is dedicated to my wonderful siblings Catherine, Charles, Collins and Adefisayo.

Adedayo

19/03/2019

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DATE

CERTIFICATION

This is to certify that this Project was carried out by **Mr. Clement Adedayo IBIDAPO** of the Department of Agricultural Economics and Extension, Federal University Oye-Ekiti, Ekiti state Nigeria.

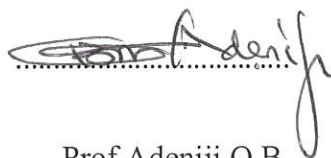


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ABSTRACT.

The study dealt with the possibility of reducing dependence on food importation by replacing foreign products with locally sourced food products. Primary and secondary data were used to accomplish the objectives of the study. Primary data were collected using detail questionnaire and focused group discussion and laboratory analysis. A multi stage sampling techniques was used to select respondents. A purposive sampling was used to select Ado out of all the towns and villages in the State. All other towns and villages were rural and standard outlets were not present except Ado. Therefore, Ado was selected because it vividly reflects the feature under study. The next stage was random sampling of five outlets operating in Ado Ekiti. Twenty salad consumers were randomly selected out of the buyers patronizing the outlet. Each twenty were people of different age to accommodate variation that might arise from age difference of both male and female respondents with a total sample size of 100 respondents in the study areas. Descriptive and inferential statistics were applied to data collected. Results indicated that the local salad compete favourably with foreign salad in terms of colour, odour, taste and other sensory parameters evaluated. The orthodox budget analysis indicated that garden egg salad was more profitable than cabbage salad. The correlation outcome value of +1 indicates that local salad is a perfect substitute for foreign salad, therefore phasing out foreign salad and replacing it with locally sourced salad is feasible. It is established in this study that cabbage salad can be replaced with garden egg salad thereby reducing the degree of dependence on food importation in the study areas given that garden egg fruits is indigenous and abundantly produced in the study areas.

CHAPTER ONE

1.0 INTRODUCTION

There is a threefold rising trend in Nigeria, a rising domestic food demand arising from population explosion, a rising food shortfalls and a rising food importation in Nigeria. Nigeria Bureau of Statistics (2017) indicated that India, United States, Spain, Netherlands and France were major export partners accounting for 17.44%, 13.92%, 9.9%, 6.79% and 6.32% respectively in Q3 of 2017 while the major import partners were China, United States, Netherlands, India and United Kingdom's importing about 46% of total import in third quarter of 2017. Nigeria had a positive trade balance of 1.22 billion naira in third quarter of 2017 but a serious trade deficit in Agricultural and food sector.

Nigeria is experiencing a reoccurring negative trade balance Lakin (2018) and its annual food import bills is greater than one trillion naira while the export bill accrue to the nation is about 1.5 billion naira Audu (2018). The deficit between food import and export is outrageously embarrassing even while using the likely moderately downward adjusted Audu 2018 statistic of \$22 billion worth of annual food import and Lakin (2018) food export value of \$1.5 billion naira giving a deficit of about \$20 billion. Nigerian government (2018) reported annual food import value of one trillion naira but Audu (2016) reported annual food import of \$22 billion and repeated the same value in 2017. Audu value is likely to have been reviewed downward for political implication. Out of a total value of 5.92 trillion value of export from Nigeria, agricultural and food account for only 253.68 billion naira representing 4.3% in Q3 of 2017. Oil always account for more than 80% of Nigeria export. Nigerian a leading crude oil producer imports

processed fuel worth about 5trilling naira in Q3 of 2018, Nigeria is importing what it produces with negative implication of loss revenue, employments and value addition incomes. Out of total trade in Agricultural Sector representing 253.68-billion-naira total agricultural export in the third quarter was 21.47 billion naira while total agricultural import was 232.2billion naira with negative trade balance of 211billion naira in Q3 of 2017. The import of agricultural products such as raw and process foods is more than ten times what we produce. Food supply therefor is a function of imports. Nigeria depends heavily on food imports. A situation which makes the country vulnerable in periods of war. Nigeria imported 43 trillion-naira worth of foods in six years and some of the food items can be produced locally. Wheat, rice, sugar and fish accounted for one trillion-naira value importation in a year. Nigeria depends on food importation to meet the nutritional demand of the teaming population. There is constant trade deficit in agricultural sector of our economy. Food importation is embarrassingly higher than food export. Government effort over the years to through Green Revolution(GR) Operation Feed the Nation (OPFN), Food Accelerated Programmed (FAP), Agricultural Development Programs (ADP), Cassava Initiatives(CI), River Basing Development Authority(RBDA), Agricultural Credit Guaranteed Scheme (ACGS),Bank of Industry (BOI) Peoples Bank (PB) and Cocoa Commodity Board (CCB) among others failed woefully to secure food security in Nigeria. Industrial supplies import account for 27%, capital goods 23% and food and beverages account for 17% of total import in 2014 and Nigeria depend on food import than domestic food production. For instance, Nigeria produced 2million metric tons of rice annually but imports 3million metric tons to feed her citizens. Nigeria import 1.93-billion-naira worth of food per annum in a period of 1990-210(NBS 2010: CBN,2010 and Afolami et al, 2014). Food import is more than five times the

value of food export (Adedayo et al 2014: Oboh and Elusiyan 2004: Oboh et al 2007: Nwaogu et 2007 and Ogiebor 2008).

Nigeria imports cars, electronics, planes without making attempt to produce it is own. Damaged cars are part of national imports. Nigeria is a tropical region with natural wood everywhere but Nigeria imports tooth pick from neighboring countries. A dumping grounds for substandard and counterfeiting imported articles. A nation in trouble of imports. Vegetables such as okra fruits, cabbage cucumber, carrot, and tomatoes are imported to Nigeria via Lagos Benin border. Cameroons and Benin republic is goods exporter of tomatoes Cabbage, and carrot to Nigeria.

There is a constant struggle to overcome the endemic food problem in Nigeria (Ayanwale and Abiola, 2007). There is a national call to bridge the gap in shortfalls between domestic food demand and supply by looking inward. Can we reduce food importation? By sourcing salad ingredient locally. Cabbage has zero production in the state and all supplies of cabbage is foreign in the state. Without import of cabbage to Ekiti state consumption will be zero. Garden egg most especially the white colour variety is produced in all the sixteen local government areas in Ekiti State. Available everywhere and readily cultivated in the State. Cabbage is used as side dish in salad preparation and garden egg is mostly not the main meal but supplementary.

1.1 RESEARCH QUESTIONS

The following questions were provided answers to in this research

1. If garden egg can do what cabbage will do, why the mad rush for cabbage importation?
2. Can cabbage be replaced with Garden Egg?
3. Will garden be acceptable to consumers in salad preparation?
4. What will be the cost and nutritional Implication of replacing cabbage with garden egg?

The study provides answer to these research questions above. The study will be of great benefit to Ekiti State and Federal Government on how to solve the endemic problem of food insufficiency. It will help policy maker on how to stem the problem of excessive food importation in Nigeria.

1.2 OBJECTIVES

The main objective of the study is to carry out economic analysis of replacing foreign salad with local salad in the study areas. The specific objectives include the following:

1. Determination of the possibility of replacing foreign salad with locally sourced salad:
2. To determine and compare the sensory evaluation of the two categories of salad.
3. To as to determine the degree of acceptability and estimate cost benefit analysis of the local salad,
4. To compare and contrast the nutritional value of the two categories of salad with the possibility of stopping cabbage importation and massive local garden production in the state.

1.3 JUSTIFICATION

There is a constant struggle to overcome the perennial food deficit in Nigeria. This has led to a national call to bridge the gap of shortfalls between domestic food demand and supply. This study is an attempt to reduce food importation through sourcing salad from healthy available vegetables such as solanum fruit as vegetable. The study will be of great importance to domestic farmers by providing ready market and good demand for products which has been greatly reduced in the past. it serve as a rentable tool for the government to discourage food importation.

CHAPTER TWO

2.0 LITERATURE REVIEW

A salad is a dish consisting of a mixture of small pieces of food, usually vegetable (Merriam-Webster 2014.) Salad is been prepared using different ingredients which include varieties; salad contains virtually any type of ready to eat food. Salads are typically served at room temperature or chilled (oxford university press 2014). These ingredients used often dictate consumer preference for the salad type of their choice. Ingredients used for salad includes a base of vegetables, fruits, meats, eggs or grains, mixed with a sauce.

2.1 ORIGIN OF SALAD

The word "salad" comes from the French "salade" of the same meaning, from the Latin "salata" (salty), from Sal (salt). In English, the word first appears as "salad" or "sallet" in the 14th century. Salt is associated with salad because vegetables were seasoned with brine or salty oil-and-vinegar dressings during Roman times. (Harper, Douglas.2014)) The phrase "salad days", meaning a "time of youthful inexperience" (based on the notion of "green"), is first recorded by Shakespeare in 1606, while the use of salad bar, referring to a buffet-style serving of salad ingredients, first appeared in American English in 1976.(Wikipedia 2018).

2.2 TYPES OF SALAD

GARDEN SALAD

Garden salads use a base of leafy greens such as lettuce, arugula/rocket, kale or spinach; they are common enough that the word salad alone often refers specifically to garden salads. Other types include bean salad, tuna salad, fattoush, Greek salad (vegetable based, but without leafy greens), and somen salad (a noodle-based salad). The sauce used to flavour a salad is commonly called a salad dressing; most salad dressings are based on either a mixture of oil and vinegar or a fermented milk product like kefir (Paula Deen 2016).

BOUND SALAD

Bound salads are assembled with thick sauces such as mayonnaise. One portion of a true bound salad will hold its shape when placed on a plate with an ice-cream scoop. Examples of bound salad include tuna salad, chicken salad, egg salad, and potato salad. Bound salads are often used as sandwich fillings. They are popular at picnics and barbecues.

MAIN COURSE SALAD

Main course salads (also known as "dinner salads" or as "entrée salads" in North America) may contain poultry, seafood, or sliced steak. Caesar salad, Chef Salad, Cobb salad, Chinese chicken salad and Michigan salad are dinner salads.

FRUIT SALAD

Fruit salads are made of fruit, which may be fresh or canned. Examples include fruit cocktail.

Note that "fruit" here refers to culinary fruits, many common components of vegetable salads (such as tomatoes and cucumbers) are botanical fruits but culinary vegetables (Gibbs Smith, 2006)

DESSERT SALAD

Dessert salads rarely include leafy greens and are often sweet. Common variants are made with gelatin or whipped cream; e.g. Jello salad, pistachio salad, and ambrosia. Other forms of dessert salads include snickers salad, glorified rice, and cookie salad (Gibbs Smith, 2006).

2.3 SOURCES OF SALAD

2.3.1 FOREIGN SOURCE SALAD

This are salad type that are prepared using exotic species of vegetables and fruits Example ;
Cabbage.

Vegetables are rich sources of vitamins, minerals, dietary fibers, fats, starch, and energy hence, significant in human nutrition (Acedo and Weinberger, 2009). Vegetables are major sources of vitamin C, together with carotenoids, anthocyanin, and glucosinolates, which are antioxidants that can inhibit several human diseases. Dietary fibers in vegetables, which consist of cellulose, hemicellulose, pectin, and lignin, also contribute to improved human healthiness. According to Wilkerson et al. (2007) that the phytochemicals found in fresh vegetables and fruit have anti

flammatory, enzyme inhibiting and bioactive features capable of combating the activities of oxidants. Phytochemicals are strong antioxidants that can modify metabolic activity, aid in the detoxification of carcinogens, and even influence processes in a tumor cell and (Wargovich ,2000) stated that it is best to consume a variety of fruits and vegetables, rather than limiting oneself to those with highest antioxidant capacity. International Journal of Basic and Applied Science, (Gonzales and Acedo Jr Vol. 05, No. 01, July 2016, pp. 13-23 14 Insan Akademika Publications)

Cabbage is scientifically known as *Brassica oleracea* var. *capitata*. It belongs to the Brassicaceae family which includes kale (*Brassica oleracea* var *acephala*), Chinese cabbage (*Brassica pekinensis* (Lour Rapr.) and Brussels sprouts (*Brassica oleracea* var. *gemmifera* DC). Initially cabbage was used for medicinal purposes such as treatment for gout, stomach problems, headache and deafness, while today it is mainly used as a fresh market crop and for processing. Fresh market cabbage is used for cooking (as main dish or mixed with other vegetables in stews) and making of salads (e.g. Cole slaw). There are three types of heading cabbage, namely green, red and savoy. They contain different amounts of nutrients with savoy being more superior (Peirce, 1987). For processing, cabbage can be mixed with other vegetables or sold as stir-fry and for making sauerkraut (Shoemaker, 1949; Ryder, 1979; Smith, 1995). Cabbage is a biennial crop that is grown as an annual, unless it is grown for seed production (Ryder, 1979; Pierce, 1987). The transition from vegetative to reproductive growth is triggered by temperature. It is a cool season crop, therefore, it will produce flowers if grown in areas of mild winters. The optimum temperature for growth is 15-18 °C. Cabbage can tolerate freezing temperatures but is less tolerant to high temperatures. However, there are some varieties that have been bred for heat tolerance (Tindall, 1979; Hemy, 1984; Pierce, 1987).

Cabbage is an excellent source of vitamins C, A and K (FAO, 2000; Fowke et al., 2003) as cited by (Ojetayo et al., 2011). In cabbage a 100g edible portion comprises 1.8g protein, 0.1g fat, 4.6g carbohydrate, and 0.6g mineral, 29mg CA, 0.8mg Fe and 14.1mg Na. Moreover, it is a rich source of vitamin A and C (FAO, 2000). Beecher (1994) noted that consumption of cabbage, is known to reduce the risk of several cancers, especially lung, colon, breast, ovarian and bladder cancers. Research also reveals that crucifers provide significant cardiovascular benefits. Aquino (2003) projected that more than 5.7 million households in the world are actively involved in vegetable production. Over 80% of vegetable growers are smallholders, For many of these smallholders, there are few alternative means of generating an income; hence the income gap between rural and urban households is increasing (Batt et al., 2007).

2.3.2 HISTORY AND ORIGIN OF CABBAGE

Cabbage (*Brassica Oleracea*) is a member of the genus *Brassica* (Plants database, United States 2012) and the genus family, *Brassicaceae*, it is sometimes known as Cole crop (Delanut, K.A).

Cabbage was originally used to refer to multiple forms of *B. oleracea*, including those with loose or non-existent heads (Texas A&M university 2013). A related specie, *Brassica rapa* is commonly named Chinese, Napa or celery cabbage and has many of the same uses (Schneider, Elizabeth 2001). Although cabbage has a very comprehensive history (A history of food, 2nd Ed 2009): It is difficult to trace it exacts origins owing to the many varieties of leafy green classified as “brassicás” (Ingram, Christine 2000). The wild ancestor of cabbage (*Brassica oleracea*) originally found in Britain and continental Europe is tolerant of salt but not encroachment by other plants and consequently inhabits rocky cliffs in cool damp coastal (Dixon 2012).

2.3.3 CULTIVATION OF CABBAGE

Cabbage is generally grown for its densely leaved heads produced during the first year at its biennial cycle. Plants perform best when grown in a well-drained soil in a location that receives full sun. Different varieties prefer different soil types, ranging from lighter sand to heaviest clay, but all prefer fertile ground with a PH between 6.0 and 6.8(Bradley et al 2012).For optimal growth there must be adequate levels of a nitrogen in the soil, especially during the early formation stage and sufficient phosphorus and potassium during the early stages of expansion of the outer leaves (Wien and Wurr 2010). Temperatures between 4 and 24^{0c} prompt best growth and extended periods of higher or lower temperature may result in premature bolting (Bradley et al 2012). Cabbage plants are generally started in protected locations early in the growing season before being transplanted outside, although some are seeded directly into the ground farm which they will be harvested (University of illonis extension 2012). Seedlings emerge in about 4-6 days from seeds planted 1.3cm (0.5 in) deep at a soil temperature between 20 and 30^{0c} (68 and 86^{0F})(58). Growers normally place plants 30 to 61 cm apart (University of illonis extension 2012) closer spacing reduces the resources available to each plant ,especially the amount of light and increases the time taken to reach maturity(Wien and Wurr 2010). Some varieties of cabbage have been developed for ornamental use, these are generally called “flowering cabbage”. They do not produce heads and feature purple or green outer leaves surrounding an inner grouping of smaller leaves in white , red or pink (University of illonis extension 2012). Early varieties of cabbage takes about 70 days from planting to reach maturity, while late varieties take about 120 days (Maynard and Hochmuth 2011) cabbages are more mature when they are firm and solid to the touch .They are harvested by cutting the stalk just below the bottom leaves with a blade.

The outer leaves trimmed and any diseased, damaged or necrotic leaves are removed (Thompson, A. Keith 2003). Delays in harvest can result in the head splitting as a result of the expansion of the inner leaves and continued stem growth (Wien and Wurr 2010) factors that contribute to reduced head weight include: growth in the compacted soil that result from no till farming practises, drought, waterlogging, insect and disease incidence and shading and nutrient stress caused by weeds (Wien and Wurr 2010).

Soil and climatic requirements

Cabbage thrives in well-drained, moisture-retentive, loamy soils well supplied with organic matter. It does not grow well in highly acidic soil. The ideal soil pH ranges from 6.0 to 6.8 () and it should not be allowed to drop below 4.5. The optimum temperatures for growth and development are from 18 ° to 20 °C. It is fairly resistant to frost and can survive temperatures as low as -3 °C without damage. Cabbage is also adapted to a wide variety of weather conditions and can as such be grown throughout the year in most regions.

2.3.4 CULTURAL PRACTISES OF CABBAGE

Propagation

Cabbage is propagated from seeds. The land should be clean and it should be cultivated 8 weeks before planting. The ground must be ploughed deeply, immediately before planting, with a disk

harrow or other suitable implement to a depth of 450 to 600 mm. The soil should be fumigated 2 weeks before planting time if necessary, to control nematodes.

Planting

Cabbage may be planted by direct seeding or trans-planting of seedlings. If direct seeding is to be used, about 2 kg of seed per hectare may be required. Seedlings should be transplanted as soon as they reach the desired size and, only well-hardened, young, stocky plants should be used. Transplanting is done in moist soil. The soil around the roots should be firmed and irrigated as soon as possible after setting the seedlings. In wet areas cabbage should be planted on raised beds or ridges to reduce waterlogging and stem or root rot diseases. Plant populations of 40 000 to 45 000 per hectare are suggested for large-headed types while for cultivars with medium-sized heads, populations of 55 000 to 65 000 plants per hectare are said to be ideal. For baby cabbage, populations of 80 000 to 100 000 plants per hectare are recommended. It is recommended that large-headed cultivars should be planted 600 to 700 mm apart between rows and 450 mm apart within rows. Smaller-headed varieties are planted 600 mm between rows and 300 mm within rows.

Fertilisation

Fertiliser programmes should be based on soil analyses and should be developed for each field. Cabbage requires 200 to 250 kg nitrogen per hectare. Nitrogen is supplied in split applications, where half to two-thirds are broadcast and ploughed in just before planting. The first application is made together with phosphorus and potassium. The remainder is applied as a side dressing 2 to 3 weeks after transplanting and again 3 weeks later or applied (once-off) at about 6 weeks. A top

dressing of 300 kg LAN should be applied approximately 4 weeks after transplanting and again 4 weeks later if required

Irrigation

Cabbage should be irrigated immediately after sowing or transplanting. Thereafter, irrigation should be applied at intervals of 10 to 12 days in heavy soils or 8 days in light soils and the schedule should be followed until the heads are fully developed and firm. Young plants should receive enough water for vegetal growth before forming heads. Excess moisture when the heads have formed may cause them to crack.

Weed control

Weeds are controlled mechanically or by hand as well as chemically by applying registered herbicides. Mechanical cultivation should be done during land preparation until the plants are about half-grown. The first cultivation should be done 2 to 3 weeks after transplanting. Pest and disease control frequent pests that affect cabbage are: Aphids (several kinds), diamond-back moth, Bagrada bug, American bollworm, cabbage webworm, greater cabbage moth, red spider mite, cutworms, Plusia looper, thrips, and nematodes. Control can be achieved by practicing crop rotation. Always try to keep the field clean and free of weeds as weeds could serve as a host for many pests. Frequent diseases include: damping off, Sclerotinia rot or white mould, club root, Fusarium wilt or cabbage yellows, black leg, downy mildew, black rot and bacterial and leafspot. Control can be achieved through chemical means, planting tolerant or resistant

2.3.5 NUTRITIONAL COMPOSITION OF CABBAGE

Table 1: Nutritional Composition of Cabbage

Vitamins	Quantity	+DV%
Thiamine	0.061mg	5%
Riboflavin (B2)	0.040mg	3%
Niacin(B3)	0.23mg	2%
Pantothenic acid(B5)	0.212mg	4%
Vitamin B6	0.124mg	10%
Folate(B9)	4ug	11%
Vitamin C	36.6mg	44%
Vitamin K	76ug	72%
Minerals	Quantity	+DV%
Calcium	40mg	4%
Iron	0.47mg	4%
Magnesium	12mg	3%
Manganese	0.16mg	8%
Phosphorus	170mg	4%

Potassium	170mg	4%
Sodium	18mg	1%

SOURCE: USDA Nutrient Database.

2.3.6 NUTRITIONAL BENEFITS OF CABBAGE

1. It helps in keeping inflammation in check.
2. It helps improve Digestion.
3. It help to keep the heart healthy
4. May lower blood pressure.
5. It reduces cholesterol levels.
6. It is an excellent source of Vitamin K.

2.4 LOCAL SOURCE SALAD

2.4.1 ORIGIN OF GARDEN EGG

Garden egg (*Solanum Spp*) is a vegetable with increasing popularity in the world (Pessarakli and Dris, 2003), and it originated from tropical Africa (Norman, 1992). It is an economic flowering plant belonging to the family Solanaceae, whose members are mostly herbaceous plants. The

fruit is berry; the seeds have large endosperm, and are grown mainly for food and medicinal purposes. Nutritionally, garden egg contains water (92.5 %), protein (1 %), fat (0.3 %), and carbohydrates (6 %). Medicinally, a meal of garden egg is proven to be of benefits to patients suffering from raised intraocular pressure (glaucoma) and convergence insufficiency, as well as in heart diseases and arteriosclerosis (Guardian, 2009). The crop is widely cultivated across most of the African continent, and more intensively in West and East Africa: It is consumed almost on daily basis by urban families and also represents the main source of income for producing households in the forest zones of West Africa (Danquah-Jones, 2000).

2.4.2 CULTURAL PRACTISES OF GARDEN EGG

Climate

A long growing season of about 120 days is required for successful production. Eggplant is a warm weather plant that grows best under temperatures of 21 ° to 29 °C. It cannot tolerate frost, and the growth of young plants will be retarded when night temperatures are below 16°C. Cool temperatures and cloudiness can reduce fruit set. Eggplant can tolerate drought and excessive rainfall, but struggles to grow when temperatures exceed 30°C. When temperatures and humidity are high, eggplant becomes more vegetative. (N.S. Talekar, J.F. Wang and C.H. Ma)

Soil

Eggplant prefers a soil that is deep, fertile, well drained, high in organic matter, and has a pH of 5.5 to 6.8. A sandy loam soil is ideal when an early yield is desired. Heavy clay and saturated soils should be avoided due to the build-up of root-rotting diseases.

Seed treatment

No treatment is needed if you are sowing fresh, vigorous seed in sterilized soil. Otherwise, soak seeds in warm water (50 °C) for 30 minutes, rinse them in cold water, and dry them before sowing. Seeds may be further treated with Thiram to prevent seedling rot. The optimum temperature for germination is at 24 to 29 °C. At this temperature, seedlings should emerge in six to eight days. Use fresh seed; seeds older than two years will be less vigorous.

Seedling production

Transplants are usually used to establish a uniform and complete stand of plants. Transplants grown in cells or containers are ideal because they allow field planting without disturbing the root system. Plug trays or containers are filled with a sowing medium such as peat moss, commercial potting soil, or a potting mix prepared from a combination of soil, compost, rice hulls, vermiculite, peat moss and sand. Sterilize the soil mixture by autoclaving or baking at 150 °C for 2 hours. Plug seedlings are raised under greenhouse conditions. Fertilize seeds weekly after two weeks, preferably with a water-soluble fertilizer solution. Plug seedlings will be ready to set in the field four to five weeks after sowing. Seeds may also be sown in seedling beds (Fig. 3). The seedbeds should be fertile and well drained. The bed area can be incorporated with fertilizers at 40 g/m² ammonium sulphate, 50 g/m² superphosphate, 30 g/m² potassium chloride,

and 2 kg/m² of compost. Prepare seedbeds which are 15 cm high and 0.8 m wide, and sow the seed in rows of 6 cm apart and 0.5 cm deep. Apply a thin layer of compost on the bed before mulching with rice straw and cover them with a mesh screen net. Thin seedlings at the first true leaf stage. They will be ready for transplanting in five to six weeks after sowing. Raised beds are recommended in eggplant production. Recommended plant spacing varies depending on variety, soil type, and cropping system. AVRDC uses 1.5-m-wide beds (furrow to furrow) that are 20.25 cm high. A single row of plants is planted in the middle of the bed. Plants are spaced 50 cm apart for a plant population density of 13,333 plants/ha. (N.C. Chen, T. Kalb, 2002)

Transplanting

The ideal transplant is a seedling with three to four true leaves, stocky and disease-free, and without flower buds. Begin hardening plants six to nine days before transplanting to reduce transplanting shock. Slightly withhold water. Expose seedlings to stronger sunlight by removing the netting. Water seedlings 12 to 14 hours before transplanting to the field. Transplanting should be done in the late afternoon or on a cloudy day in order to minimize transplanting shock.

Transplant seedlings by digging a hole deep enough to bury a plant so that its first true leaf is just above the soil surface. Press the soil firmly around the root. Irrigate furrows immediately after transplanting. Transplanting can be done manually or by machine. If transplanting is done by machine, the plug seedling trays must be compatible with the transplanter. The field should be irrigated immediately after transplanting to establish a good root-to soil contact. (N.S. Talekar, J.F. Wang and C.H. Ma)

Mulching

Mulching is recommended to reduce weeds, prevent soil compaction, and conserve soil moisture. Plastic mulch must be laid before transplanting and holes are made through which the plants can be transplanted. Organic mulch is usually laid after transplanting (Fig. 9). Plastic mulching is outstanding for preventing weeds, while organic mulching cools soil temperatures. For that reason, the combination of these mulches is often used during the hot season.

Fertilization

Adequate application of manures and fertilizers is very important for successful crop production. Being a long duration crop, eggplant requires a large quantity of fertilizers. Fertilizer rates depend on the soil fertility, organic matter content, and texture. A soil test is strongly recommended. In the sandy loam soils at AVRDC, typical fertilizer rates are 170 kg/ha of N, 70 kg/ha of P₂O₅, and 180 kg/ha of K₂O. Table 1 shows how fertilizer amounts should be distributed during the growing season. Using nitrogen (N) as an example, 30% of the total N should be applied before transplanting (basal), 15% applied in each side dressing (three and six weeks after transplanting), and 40% applied during the harvest (typically in four applications each spaced two weeks apart). Organic fertilizers improve the overall structure and condition of the soil. Compost (10 t/ha) or chicken manure (3 t/ha) are commonly used. Organic fertilizer is applied before transplanting. Garden egg can be raised using plastic and organic mulches.

Table 2: Percentage distribution of chemical fertilizer during the growing season.

Nutrients	Basal	3 Weeks	6 Weeks	During Harvest	Total
N	30	15	15	40	100
P	50	0	50	0	100
K	30	15	15	40	100

Source; Wikipedia, 2017.

Irrigation

Irrigation is essential for eggplant cultivation wherever little or no rain is available during the growing season. Irrigation is most critical during the time of flowering and fruit set. A lack of water during this period could lead to the development of blossom rot and malformed fruit.

Reduction of fruit size and yield are also caused by moisture stress. Wilting during the late morning is a good indication that the crop needs irrigation. Eggplant is a medium-rooted crop with a root zone depth of 90 cm in well-drained soil. Irrigate soil to at least 45 cm deep. The method of irrigation depends on soil texture, topography, and water supply. Generally, furrow (surface) irrigation and drip irrigation systems are used. In addition, mulching with black plastic will maintain more uniform soil moisture between irrigations.

Weed control

Eggplant is slow to become established and cannot compete with aggressive weeds. Weeds also harbour damaging insects and diseases. Weeds are controlled either by physical methods or chemical control. Physical methods, such as hand weeding, cultivation, and mulching are quite common in small vegetable farms. Only shallow cultivation is necessary. Mulching with black plastic mulch effectively controls weeds and reduces labour needs. Natural organic mulches, such as rice straw, will conserve moisture and add organic matter to the soil. Chemical weed control is especially popular in places where labour is expensive. Suitable herbicides include Lasso, Enide 50WP, and Sencor 70WP. The best chemical, rate, and method of application will vary depending on the weed species present, soil type, and temperature at time of application. Follow all instructions on the label of the herbicide.

Staking and pruning

One month after transplanting, a bamboo stake (100. 120 cm) is placed nearby each plant to support the plant from fruit load. Pruning is recommended to produce bright-colored, high quality fruit. Maintain three branches per plant: two branches from the primary division of the main stalk and one branch below this division. All the other lateral branches are removed periodically. Remove older leaves from the lower portions of plants to allow for more air circulation and lighting within the canopy.

2.4.3 NUTRITIONAL BENEFITS OF GARDEN EGG

Being a member of the vegetable family, it contains nutrients that include better carotene, vitamins B6 E and foliate, calcium, iron, magnesium fibre and many essential vitamins and minerals. They come in two shades, the cream and green colour.

i. **Lowers Cholesterol:** The fiber content in the eggplant also helps to lower cholesterol levels in the human body, protecting the heart in the process.

ii. **Lowers blood sugar:** It is a great dietary option for diabetic patients because of its ability to reduce glucose absorption in the body and lower blood sugar levels. It also possesses low soluble carbohydrates, which assist in this regard. **Garden egg aids digestion:** It improves digestive system, beneficial for constipation and ruling out bloating totally.

iii. **Improves vision:** The cream-colour flesh has a pleasantly bitter taste (due to the presence of small amounts of nicotinoid (alkaloids) and spongy consistency for protection from poor vision due to glaucoma.

iv. **Great during pregnancy:** We don't have enough space to explain how useful it is for pregnant women. It is packed with vitamins, minerals, and other nutrients which make it an essential part of the daily ration of every pregnant woman. Given the fact that the baby is taking much of the useful nutrients for himself, women often suffer from the lack of individual components in their body. So, eating this plant can be an excellent solution to such situations.

2.4.4 NUTRITIONAL COMPOSITION OF GARDEN EGG

Table 3: Nutritional Composition of Garden Egg.

Moisture	86.26%
Carbon	7.033%
Protein	2.322%
Fat	0.278%
Ash	1.143%
Caubet	3.99%
Iron	76.869mg/kg
Manganese	19.466mg/kg
Calcium	221.583mg/kg
Copper	2.642mg/kg
Zinc	21.460mg/kg
Vitamin	
Vitamin A	0.078mg 100g
Vitamin C	2.686mg 100g

Source; Wikipedia, 2017.

CHAPTER THREE

3.0 METHODOLOGY

3.1 THE STUDY AREA

Ado is the capital of Ekiti State and the State is divided into sixteen local area council as indicated in the figure below. Ekiti standard Food outlets are Mr Bigg, Tantalizer, Fork and Finger, Smiln, Danke, Portofino, Village Port among others. These outlets are not present in other local government areas because they are rural except Ado Ekiti.

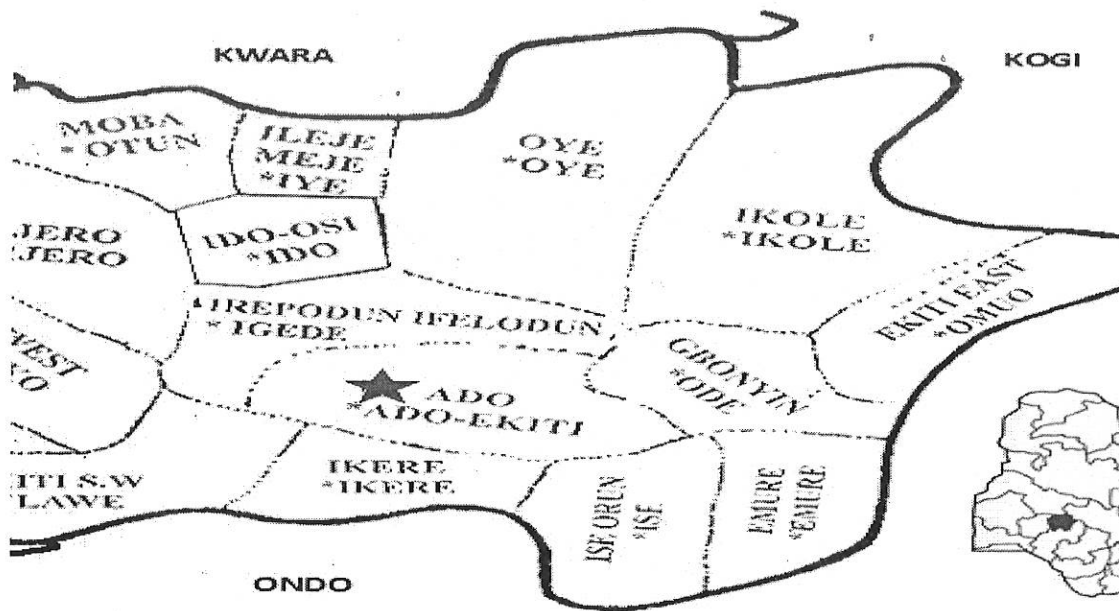


Figure: Map of Ekiti State in Nigeria: Source: Ekiti State Government 1997

3.2 Data Collection

Primary and secondary data were used to accomplish the objectives of the study. Primary data were collected using detail questionnaire and focused group discussion and laboratory analysis. Fresh garden egg fruit and cabbage leaf were purchased in Oja oba market and were cubed to provide the needed salad shapes. Deliberately the garden egg was single homogenous recipe type while the one sold in outlets were multi ingredients recipe but the lion share is generally made of cabbage leaf and the foreign salad can be tagged cabbage salad. The desire is to replace the cabbage 100% by garden egg as single recipe salad or used garden egg as substitute for cabbage in salad preparation in the state.

A beautiful white colour type of garden egg is used to replace the white cabbage. Cabbage and garden egg is a multi-colour kind of vegetable.

3.3 Sampling and Data Analysis

A multi stage sampling techniques was used to select respondents. A purposive sampling was used to select Ado out of all the towns and villages in the State. All other towns and villages were rural and standard outlets were not present except Ado. Therefore, Ado was selected because it vividly reflects the feature under study. It was followed by random sampling of five outlets operating in Ado Ekiti. Twenty salad consumers were randomly selected out of the buyers patronizing the outlet. Each twenty were people of different age to accommodate variation in that might arose from age difference of both male and female respondents with a total sample size of 100 respondents in the study area. Descriptive and inferential statistics were applied to data collected. Orthodox budgeting techniques was used to determine the feasibility of

changing from foreign salad to local salad while rank correlation was used to determine the correlation between cabbage and garden egg salad. Respondents were allowed to taste and make their decision on a scale of five which form the basis of judgments.

3.4 CORRELATION

r = correlation coefficient

Where the estimator

$$r = \frac{n \sum X_1 Y_1 - (\sum X_1)(\sum Y_1)}{\sqrt{[\sum X_1^2 - (\sum X_1)^2][n \sum Y_1^2 - (\sum Y_1)^2]}}$$

$$\sqrt{[\sum X_1^2 - (\sum X_1)^2][n \sum Y_1^2 - (\sum Y_1)^2]}$$

Where

P = acceptability of indigenous salad ranks

X = acceptability of foreign salad ranks

Spearman Rank $r = 1 - \frac{(\sum d^2)}{n(n^2-1)}$

$$n(n^2-1)$$

d^2 = difference in ranks

n = sample size

Hypothesis

H_0 = There is no correlation between foreign salad and indigenous salad degree of correlation

H_i = There is significant correlation between the acceptability of foreign salad and indigenous salad.

The hypothesis will be tested using student t test where

$$t = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}}$$

$$r\sqrt{1-r^2}$$

Autodus Budgeting Technique

Analysis of Benefit – cost relationship of foreign and indigenous source salad.

α_1 = Cost gain for not producing foreign salad

β_1 = Cost incur in indigenous salad production in naira

P_1 = Revenue realized in the sale of in naira units indigenous salad

W_1 = Revenue loss for non-production of foreign salad

DD = Decision differentials

Where

Benefit = $(\alpha_1 + P_1) \# = U$

Cost = $(\beta_1 + W_1) \# = M$

DD = Benefit – Cost

= U- M

Where DD is positive. It is beneficial for Nigeria to produce INDIGENOUS Salad while DD is negative, it is advisable for Nigeria to continue with importation of foreign salad material and domestic sourcing of salad.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 SENSORY EVALUATION OF LOCAL AND FOREIGN SALAD IN THE STUDY AREA.

4.1.1 COLOUR PREFERENCE EVALUATION

The foreign salad had a better acceptability in terms of colour evaluation. The two had a positive colour and acceptability status of greater than 90% and negative colour evaluation of less than 10% (Table 1). The local had a 1% higher value of negative index and a 1% lower value of positive colour value indicating a marginal difference in general acceptability among respondents in the state. The outcome indicates that the colour of local salad compete favourably with foreign salad and policy should be geared toward replacing foreign salad with domestic or indigenous source salad in the study area as a way of reducing possible trade deficit in the country in with too much dependency on food importation.

Table 4: Colour Preference Evaluation

Evaluation Class	Frequency	
	Local Salad	Foreign Salad
Very Poor	1.00	4.00
Poor	7.00	2.00
Good	31.00	22.00
Very Good	35.00	39.00
Excellent	26.00	33.00
Total	100.00	100.00

Source: Field Study 2018

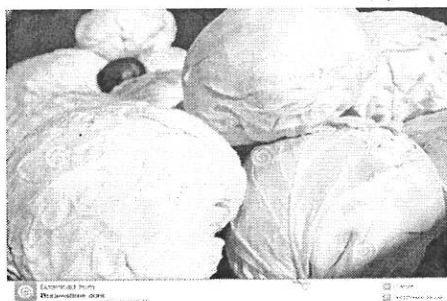


Figure 2 Cabbage and Garden Egg Fruit Colour: Source; Adedayo et al 2010

4.1.2 Odour Preference Evaluation

The outcome indicate that foreign salad had a value for very poor but none rated the local salad poor (Table 2). Also, local salad was rated 16% higher in terms of good attribute value but

foreign salad had lower negative scale value. Local salad had total positive scale value of 87% while foreign salad had a value of 93%. The two had acceptable positive value in odour evaluation indicating the two-smell fresh and good. Therefore, phasing out foreign salad will be with little or no negative impact owing to the good degree of indigenous source salad acceptability and a ready substitute for cabbage

Table 5: Odour Preference Evaluation.

Odour Class		Frequency	
		Local Salad	Foreign Salad
Very	Poor	0.00	1.00
	Poor	13.00	6.00
	Good	43.00	27.00
Very	Good	25.00	41.00
	Excellent	19.00	25.00
Total		100.00	100.00

Source: Field Data.2018

4.1.3 Matching Evaluation by Teeth

Foreign salad had better teeth grinding evaluation status than local salad. This is probably due to lower moisture availability in garden egg which makes it harder to chew than cabbage with higher water content making it softer in term of texture and grinding capacity of teeth. However, there are varieties of garden egg with higher moisture capacity that can neutralize these negative

features and harvesting early will also count in term of improving mouth grinding status of local salad. The softer the salad the better the evaluation status in the study areas.

Table 6: Matching Preference Evaluation

Matching Class	Frequency	
	Local	Foreign
Very Poor	70	2
Poor	7	11
Good	4	20
Very Good	2	29
Excellent	17	29
Total	100	100

Source: Field Data,2018

4.1.4 Taste Preference Evaluation

The local garden egg salad is perfect substitute for cabbage salad (Table a). The two had equal negative and positive evaluation status in the study areas. The study outcome indicates that Nigerians has good acceptability status for their products provided there is availability. In most cases in Nigeria some food item has no local substitute: for instance, Igbemo rice is a popular rice in Ekiti State but such rice does not appear in standard shops because of poor packaging since there is no bag, label or brand for this local rice but it is sweeter and generally available in the state. The rice is sold in Gerri cans, Kongo, paint rubbers and other local measures. The taste of this rice is generally more acceptable to consumer. In most standard outlets cooked Igbemon

rice attracts a unit price of five hundred naira while the foreign rice attracts two hundred and fifty naira. The outcome here indicate that Nigeria can come out of food importation problem if it can work more on domestic source and other neglected food resources in the country.

Table 7: Taste preference Evaluation.

Evaluation Class	Frequency	
	Local Salad	Foreign Salad
Very Poor	1.00	2.00
Poor	6.00	5.00
Good	32.00	31.00
Very Good	38.00	25.00
Excellent	23.00	37.00
Total	100.00	100.00

Source: Field Data, 2018

4.1.5 Orthodox budgeting Analysis Evaluation of Garden Egg and Cabbage Salad

The orthodox budget analysis indicates that there is 216.5-naira positive beneficial revenue gained per kg for producing garden egg salad instead of cabbage salad (salad Table 6). The outcome shows that garden egg salad is more profitable than cabbage salad in the study areas. Ten units are derivable in every kilogram of garden egg fruit or cabbage. A salad unit is sold at standard price of #300 in food outlets operating in Ado Ekiti. Garden egg fesh fruit commands an average price of #97.5 per kilogram while cabbage fresh leaf was sold at a mean value of #314 per kilogram. Cabbage is more expensive because it is not produced at all in the state. It is 100% foreign in the state. Cabbage contains more water and transportation and other factors

probably accounts for high price. Garden egg contains lesser water but it is produced in all the 16 LGA areas in the state. It is 200 times cheaper. Garden egg in all season has lower price than cabbage. However, the market price of cabbage and garden egg salad is the same making the sales of garden egg salad more profitable *ceteris paribus*. A ban on importation of cabbage will have a serious positive effect on garden egg production and demand in the state. The outcome indicates that replacing cabbage with garden egg is feasible.

Table 8: Orthodox budgeting Analysis of Garden Egg and Cabbage Salad in The Study Area.

Price (Kg/N)	Cabbage	Garden egg
Market price	3000.00	3000
On season	200.00	70
Of season	428.0	125
Average price	314.00	97.5
Orthodox Budget Analysis		
Revenue gained for		
producing Garden Egg Salad		3324.00
Cost incurred for not		
producing Cabbage Salad	3097.50	
Decision Differential		216.50

Source: Field Data, 2018.

CORRELATION ANALYSIS

The correlation analysis was carried out to determine the level of relationship between the two salad source variables.

4.2 Correlation Analysis between Garden and Cabbage Salad sensory Evaluation

The outcome of correlation analysis between the two salads indicate a perfect linear correlation between garden egg salad and cabbage salad. The two are usually side dishes consumed with main meal such as fried rice and jollof rice to provide minerals and vitamins mostly available in inadequate form in the main meal. The correlation indicates the two are perfect substitute for each other. The correlation value of 1 is also significantly different from zero indicating that the two salad types had positive association

4.3 Chemical and Nutritional Composition of garden egg and cabbage

The outcome indicated that Garden egg fruit and cabbage in terms of moisture content mineral and chemical composition were good substitute as indicated in table below. Garden has higher protein content and good vitamin E content which is absent in cabbage. Cabbage has higher iron content but generally garden egg has higher essential nutrient value than cabbage. The nutritional content of both vegetables is presented below.

Table 9. Chemical and Nutritional Composition of garden egg and cabbage.

PARAMETERS Concentration (%DW) *	Garden Egg Fruit	Cabbage
MOISTURE	91.4 ± 0.56	92.18g
ASH	21.2± 0.42	
CRUDE LIPID	12.5±0.07	0.1g
CRUDE PROTEIN	8.31 ± 0.63	1.28
CRUDE FIBRE	6.22 ± 0.36	1.5
AVAILABLE CARBOHYDRATE	51.74 ± 0.32	5.8g
ESTIMATED CALORIC VALUE	308.9 Kcal	25kg
Mineral element (mg/100g DW)		
Phosphorus	1085.00	26
Magnesium	39.14	12
Potassium	216.89	170
Manganese	147.	0.18
Copper	256.17	0.019
Sodium	149.34	18
Iron	326.50	0.47
Calcium	15.29	40
Vitamin Concentration (mg/100g DW)		
Riboflavin (Vitamin B2)	0.036	0.234
Ascorbic acid (Vitamin C)	6.273	36.6

Richard&Ali.2011.

CHAPTER FIVE

5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 SUMMARY

There is a rising demand for foreign products in Nigeria. This study was carried out to reduce food importation in Nigeria. The study shows that local source salad can be introduced so as to reduce the dependence on foreign source salad. This will enable the consumers in the study area of Ekiti-State to build on domestic food production. The study reveals that introduction of locally produced garden egg fruit for salad preparation in place of cabbage will be cheaper, cost effective and of high nutritional value.

5.2 CONCLUSION

It is established in this study that cabbage salad can be replaced with garden egg salad which has the capacity to reduce import dependence on foreign foods (cabbage salad) with ability to build self-sufficiency on domestic food production in Ekiti State. It is recommended based on the outcome of the study that Nigerian will be at advantage if importation of cabbage from Benin Republic, Cameroon and others could be banned to encourage domestic cabbage production in Ekiti State.

5.3 RECCOMENDATION

Based on the outcome of this study it is recommended that

- There should be a ban on the importation of cabbage from neighbouring countries; this will greatly increase domestic production of garden egg in Ekiti State.
- Local Farmers should be encouraged and empowered so as to focus more on domestic food production.
- Garden egg source salad should be introduced in every eatery and food outlet because it is cheaper and has a very high nutritional value.
- More attention should be given to locally produced foods, this will reduce the sole dependence on foreign products.

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APPENDIX

FEDERAL UNIVERSITY OYE-EKITI, EKITI STATE.

FACULTY OF AGRICULTURE

DEPARTMENT OF AGRICULTURAL ECONOMICS AND EXTENSION.

QUESTIONNAIRE ON THE ECONOMIC ANALYSIS OF REPLACING IMPORTED CABBAGE WITH LOCALLY PRODUCED GARDEN EGG FRUIT FOR SALAD PREPARATION IN EKITI STATE, NIGERIA.

Dear Respondent,

I am a final year Student(500 Level) of the department of Agricultural Economics and Extension, Federal University Oye Ekiti, Ekiti State. I am undertaking a research project titled; Economic analysis of replacing imported cabbage with locally produced garden egg fruit for salad preparation in Ekiti state, Nigeria.

This Study will only be used for academic Purpose. All gathered information will be treated confidentially.

Thank You for your co-operation as you fill this questionnaire by ticking the boxes that most appropriately conform to your opinion.

SECTION A

Sensory Evaluation & Socio Economic Case Study for foreign and indigenous Source Salad.

Respondent Gender Male Female

Respondent Marital Status.....

Respondent Age.....

Respondent Tribe.....

Household Size.....

Education

Family Size.....

Réligion.....

Marriage Type.....

Please tick the following boxes appropriately according to your analysis of the food sample provided.

		VERY POOR	POOR	GOOD	VERY GOOD	EXCELLENT
(COLOUR)	FOREIGN					
	LOCAL					
(ODOUR)	FOREIGN					
	LOCAL					
(TASTE)	FOREIGN					
	LOCAL					
(MATCHING)	FOREIGN					
	LOCAL					

SECTION B

1. Do you consume foreign source Salads? (A) YES (B) NO
2. Do you consume indigenous source salads (A) YES (B) NO
3. How often do you consume foreign source salads (A) Daily (B) Weekly (C) Monthly (D) Yearly.
4. How often do you consume indigenous Source Salads? (A) Daily (B) Weekly (C) Monthly (D) Yearly.
5. How many times do you consume foreign source salads in a week (A) 0-2 times (B) 3-4 times (C) 5-6 times (D) More.
6. How many times do you consume indigenous source salads in a Week? (A) 0-2 times (B) 3-4 times (C) 5-6 times (D) More.
7. What is the cost of Garden egg per kg in your locality?.....
8. What is the cost of cabbage per Kg in your locality?.....

9. Which is your favourite eatery in your locality (A) Tantalizers (B) Captain Cook (C) Chicken republic (D) Tasty and Spices.
10. Is foreign source salads available for sale in your favorite eatery (A) YES (B) NO
11. Is indigenous salad available for sale in your favourite eatery (A) YES (B) NO
12. What is the price of foreign source salads in your favourite eatery?
13. What is the Price of indigenous source salads in your favorite eatery?.....
14. Do you prefer cabbage and garden egg as an indigenous salad source? (A) YES (B) NO
15. Will you prefer the introduction of indigenous source salads as a replacement for foreign salads? (A) YES (B) NO
16. State your reasons.....
17. Is your choice of accepting indigenous source salad cost effective? (A) YES (B) NO
18. Do you find the ingredients of indigenous source salad sufficiently available in your locality (A) YES (B) NO
19. Aside Cabbage , garden eggs, which other ingredients will you recommend for making indigenous source salad.....
20. Is indigenous source salad generally acceptable in your area (A) YES (B) NO
21. What is the source of cabbage in your area? (A) Local (B) Foreign (C) Both (D) I don't know.
22. What is the source of garden eggs in your area? (A) Local (B) Foreign (C) Both (D) I don't know.

