

**THE CHALLENGE OF INFRASTRUCTURE DEVELOPMENT ON
PRESERVATION OF PERISHABLE HORTICULTURAL PRODUCE FOR
SUSTAINED URBAN FOOD NUTRITION IN METROPOLITAN KADUNA,
NIGERIA**

**Banake Elisha Sambo¹, Adamu Ahmed², John Taiye Omotugba³, James Odedayo
Adedapo³ and Godwin Shekwolo³**

¹Department of Crop Science, Federal University Dutse, P.M.B.7156, Jigawa State – Nigeria.

²Department of Urban and Regional Planning, Ahmadu Bello University, , Zaria - Nigeria.

³Department of Horticulture & Landscape Technology, Federal College of Forestry
Mechanization, P.M.B.2273, Afaka, Kaduna – Nigeria.

ABSTRACT: *Perishable horticultural crops as fruits and vegetables - rich vitamins, protein, minerals and fiber contents - contribute a lot to human diet. Though Nigeria produces enormous quantity of these produce, shortages in consumption and nutrition exists due to losses in the production value chain system. This is mainly attributed to lack of the development of an efficient management technique in the handling, transporting and storage systems; with attendant consequences on urban food and nutrition security in a rapidly urbanizing Nigeria. It is against this backdrop that this study was undertaken to identify the problems of handling technologies that would result in enhanced shelf-life of these commodities and healthier urban nutrition in metropolitan Kaduna, Nigeria; in 2010. Structured questionnaires and schedule interviews were used to randomly collect primary and secondary data. This was analyzed and presented using descriptive statistical analytical tools. Results indicated that the major factors affecting the storage quality of fruits and vegetables are bad roads (40%); improper production, handling and transportation (33.33%) system; harsh weather (20%); while insect pest infestation (6.67%) was least. Baskets and sacks are still used as the predominant means of storage of produce (35% and 32% respectively). Indeed, a lot of losses are recorded due to bad roads at harvest. Incidentally, the refrigerating system, the most efficient means of preservation is not predominantly used because of its exorbitant cost; and high tariffs on electricity. Where cost is affordable, power supply is epileptic due to an underdeveloped power sector. It is concluded that the intractable challenge of lack of infrastructure poses a major developmental setback in Nigeria. Indeed, this is a key challenge against the evolvement of a sustainable post-harvest management system; as well as a drawback on the fight against hunger, malnutrition and poverty – foremost objective of the UN's Sustainable Development Goals (SDG's). Consequently, there is an imperative need for massive investment in infrastructural and human capital development. Without doubt, in Nigeria today, post-harvest and infrastructural management of the food production chain remains a major challenge.*

KEYWORDS: Infrastructure, Development, Perishables, Horticulture, Post-Harvest, Sustainable, Nutrition, Security

INTRODUCTION

In a hungry and increasingly competitive world, reducing postharvest food losses is a major agricultural goal. Fruits and vegetables contribute a lot to human diet because of their

richness in vitamins (such as vitamins A and C), protein, minerals, and fiber. They also aid in providing variety and are particularly said to be important to the diet when little meat is eaten [11]. But it is sad to note that many developing countries of Africa, such as Nigeria, though richly blessed in agricultural resources, yet they have acute fruits and vegetable shortages - thus cannot meet up with the food and nutrition requirements of the citizenry - due to improper post harvest management of these fruits and vegetables [22].

Vegetable production forms a substantial percentage (about 25%) of the major food crops cultivated in the tropics and so it is the source of livelihood security for a considerable section of the population [3]. In Nigeria, enormous quantities of fruits and vegetables are produced. For instance, 3.8 million tons of onions, 6 million tons of tomatoes, 10 million tons of plantain and 35 million tons of citrus are reportedly produced annually [19]. However, the staggering production figures notwithstanding, it is the amount of the produce available to the consumer rather than the level of production that is more important. It is really an ironic situation where high production figures are churn-out, yet the populace suffers acute shortages of fruits and vegetables [24]. And this situation is likely to worsen as half the world's population is expected to turn urban by the end of 2009. A recent UN report estimates that cities in Africa and Asia will account for most of the growth in urban population by 2050 [20].

Reported studies on the endemic causes of the shortage of fruits and vegetables have shown that it is the consequence of poor handling and lack of development of proper post harvest management and storage technologies which results in their voluminous decay and spoilage [24].

Many factors contribute to postharvest losses in fresh fruits and vegetables. Fruit and vegetables in their fresh forms contain high percentage of water. They are living and hence carry out their physiological function of respiration thereby absorbing and releasing gas and other materials from and to their environment. These activities lead to their deterioration in transit and storage. This is more rapid under conditions of high temperature and humidity. As a result heavy losses are incurred. Fundamentally, most fruit and vegetable do not stay longer than 10 days after ripening. Factors ranging from physiological, bacteria, fungi, insect and mechanical damage, environmental conditions such as heat or drought, mechanical damage during harvesting and handling, improper postharvest sanitation, and poor cooling and environmental control also accelerate the spoilage of fruit and vegetable. These deteriorating agents must be controlled through proper handling during harvesting to prevent injuries. Efforts to control these factors are often very successful in reducing the incidence of disease. For example, reducing mechanical damage during grading and packing greatly decreases the likelihood of postharvest disease because many disease-causing organisms (pathogens) must enter through wounds. Chemicals have been widely used to reduce the incidence of postharvest disease. Although effective, many of these materials have been removed from the market in recent years because of economic, environmental, or health concerns [22].

For highly perishable commodities, such as tomatoes, amaranthus, squash, and peaches, as much as 30 percent of the harvested crop may be lost to postharvest diseases before it reaches the consumer. Investments made to save food after harvest is usually less costly for the grower and the consumer and less harmful to the environment than efforts to increase production. Even a partial reduction in postharvest losses can significantly reduce the overall cost of production and lessen our dependence on marginal land and other scarce resources.

Indeed, for these fruits and vegetable crops, it is difficult to ascribe exact figures of how much is lost between harvest and consumption, as most of this record is hardly kept. The persistent concern of improving on the handling and preservation of perishable agricultural produce necessarily focuses upon the reduction on post harvest losses. However it is an incumbent requirement of studies that they should include an element of loss assessment. Worldwide, however, there is still a paucity of accurate information on losses. It is however, reported that losses as high as 50% are common in fruits and vegetables between rural production and town consumption in the tropics [19]. These losses are reportedly predominantly incurred during the transportation, storage and marketing chain [10]; and the use of unsuitable packaging materials. Reports by the Food and Agricultural Organization showed that losses incurred during the storage, handling and marketing of perishable produce range from almost 0% to 100%. However, the global loss figure has been estimated at about 25% [7]. In Nigeria more than 30% of agricultural produce are reportedly lost annually [22]. In a nutshell, available data points to the fact that around one-third of all food produced is lost or wasted each year, amounting to 1.3 billion tones – or enough food to feed two billion people. Without a doubt, reported losses are specific in time and location, and are a function of dynamic factors liable to continuous change, within the post harvest system [9].

To curtail or minimize these damages, studies are required in these areas of the handling and post harvest storage of these perishable crops. Until the causative factors involved in perishable food crops spoilage are identified, and the infrastructure needed for their handling; and storage systems improved, colossal losses in the system will continue and the opportunities to reduce them would be limited. For in the long run, it is the amount of the produce available to the consumer rather than the level of production that is more important.

Consequently, the UN Food and Agriculture Organization (FAO), the international Fund for Agricultural Development (IFAD) and the World Food Programme (WFP) are reported to have launched a joint project to tackle the global problem of food losses. In particular, the three year project will focus on reducing losses of grains and pulses such as maize, rice, beans and cowpea – staple foods that play a significant role in global food security and have a major impact on the livelihoods of millions of smallholder farmers. It will identify critical points of losses in pulse and grain supply chains in three pilot countries – Burkina Faso, the Democratic Republic of the Congo and Uganda – as well as identify the best potential solutions to issues of ineffective harvesting and handling, storage moisture levels, attacks by rats, birds and other pests and insect damage [26]. Indeed, many post harvest systems would benefit from studies, as this, orientated towards the reduction of losses [23].

In fact, post harvest losses have persistently been reported to impoverished Nigerian farmers over the years, but the huge challenge has not attracted the desired attention. Year in year out, crops harvested by farmers get wasted due to lack of developed infrastructure and storage and processing facilities in various regions of the country. Over time, Nigerian farmers have lamented their pathetic sorry situation without getting any meaningful help from any quarter. Both governments at all levels and the private sector investors have failed to look towards their plight as it seems to mean little or nothing to them, while the situation gets worse by the day.

It is against this background that this base line study was undertaken with the view of identifying the challenge of infrastructural development and modalities of handling perishable horticultural crops for improved storage/self-life in metropolitan Kaduna, Nigeria.

MATERIALS AND METHOD

The study was conducted in Kaduna North local government area of metropolitan Kaduna, Nigeria (Latitude $9^{\circ} 12''$ North and Longitude $6^{\circ} 9''$ E); with its head-quarters at Magajin-Gari metropolitan Kaduna. It is comprised of six districts namely; Doka, Kabala, Hayinbanki/Abakpa, Malali, Gabasawa and Kawo; with a population of 364,573 people comprising of 187,075 males, 177,500 females [13]; and a total land mass of 74,95sqkm. The main economic activity of the people is farming which includes the cultivation of maize, rice, beans, fish, vegetables, rosette fruits, dairy products, poultry egg production and animal rearing; commercial undertaking, educational activities, politics and working in the civil service. The local government has the following markets: Badarawa, Unguwan-Dosa, Veterinary, Checheniya, Abakpa and Unguwan-Shanu markets.

Well structured questionnaires and schedule interviews were used to randomly collect primary and secondary data; as well as personal, physical survey tours. In all, 80 questionnaires were administered randomly within these markets; and 75 of the questionnaires were retrieved and processed. The information was drawn on socio-economic, demographic characteristics of the respondents, and other related factors influencing the handling, transporting and storage in the study area. The data was analyzed and presented using descriptive statistical analytical tools.

RESULTS

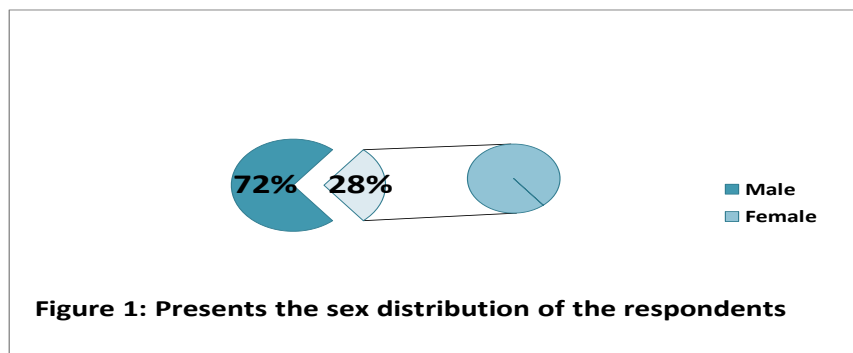


Figure 1 showed that males (72%) are more involved in the business enterprise than the female population (28%). The analysis of sex distribution shows that males are more in the business compared to female.

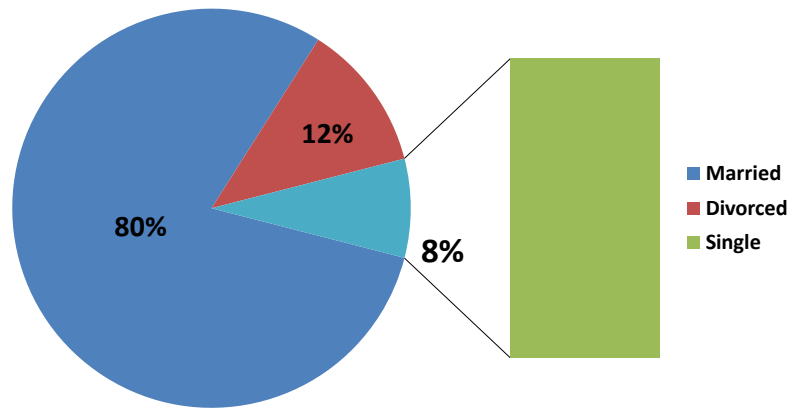


Figure 2: Marital status of respondents

Figure 2 showed that majority of the respondent who are actively involved in the business are married people (80 %). Twelve percent (12%) are divorced; while were only 8% are single.

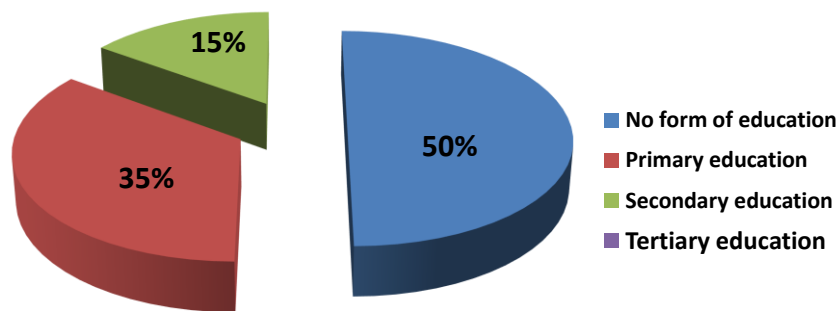


Figure 3: Shows the educational distribution of respondents

Figure 3 revealed that the respondents had varying degree of education. Majority (50%) of those engaged in the business had not acquired any form of formal education at all. Only 35% of the respondents had some education up to the primary school level; while 15% went up to the secondary school level. None of the respondents engaged in this business went beyond the secondary school level of education.

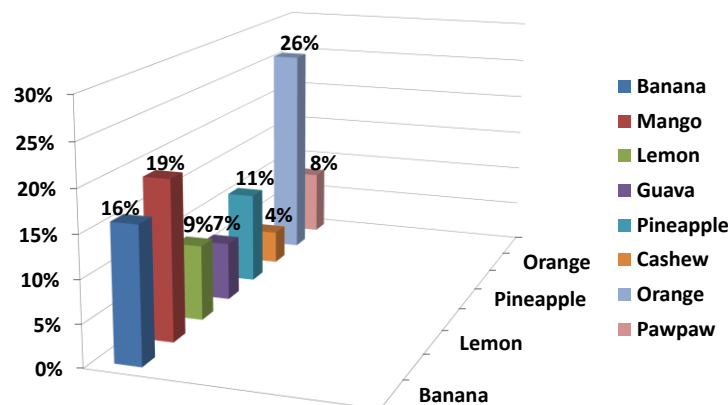


Figure 4: Distribution of various fruits marketed by the respondents

Figure 4 showed that most of the respondents/traders are engaged in orange (26 %); mango (19%); banana (16%); pineapple (11%); lemon (9%); pawpaw (8%) and cashew (4%) in that order respectively.

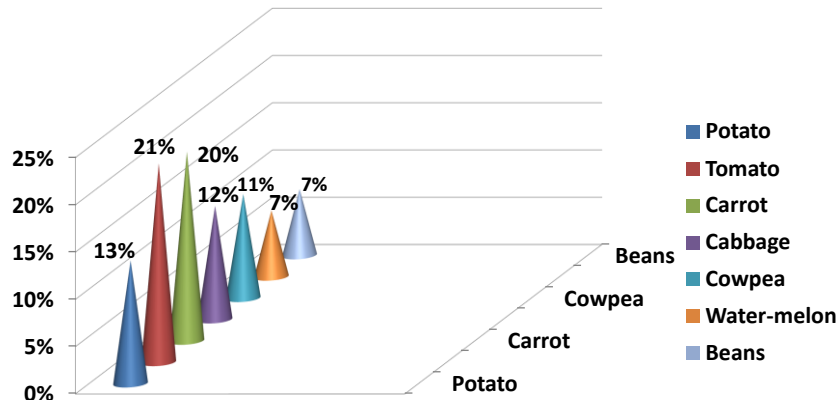


Figure 5: Distribution of various vegetables marketed

The data in Figure 5 showed that the respondents handling vegetables such as tomato, carrot and potato are more - 21%, 20%, and 13% respectively. Other respondents dealing on other vegetables such as cabbage, cowpea, water melon and beans were 12%, 11%, 7%, and 7% respectively.

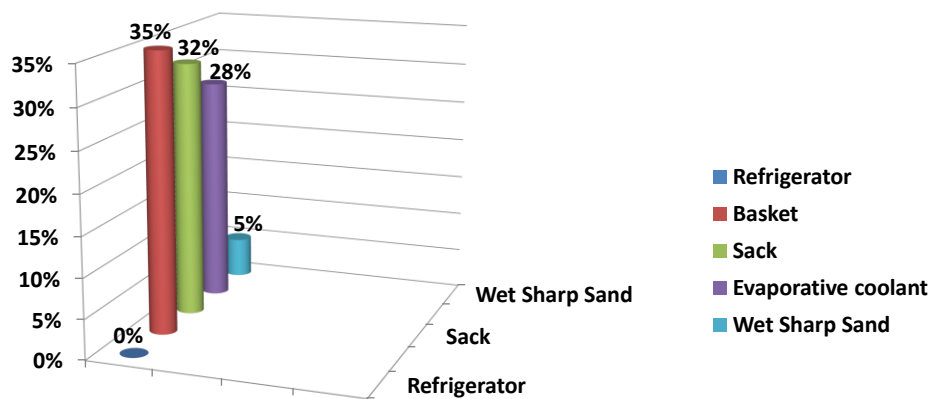


Figure 6: Shows the types of storage methods used

Figure 6 showed that most traders use baskets and sacks as the predominant means of storage of their produce (35% and 32%) respectively. An appreciable number too (28%) use the evaporation coolant method for storage of produce. Others (5%) make use of the wet sharp-sand method; while none use the refrigeration method for mass storage of produce.

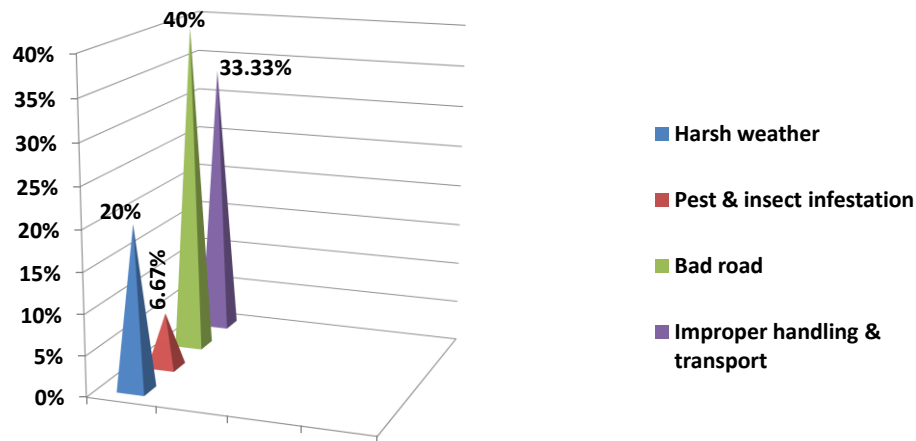


Figure 7: Shows factors causing fruits and vegetables spoilage – post harvest losses

Figure 7 revealed that the major factors that affect fruit and vegetable of the traders were bad roads (40%), improper handling and transportation (33.33%) and while harsh weather also contribute (20%). The least effect was insect pest infestation (6.67%).

DISCUSSION

Socio-Economic and demographic Characteristics of Respondents Engaged in the Marketing of High Value Perishable Horticultural Produce

The preponderance of males in the perishable produce business is probably an indication of the energy demand of the business; which invariably determines productivity. While the predominance of married farmers is an indication of the fact that married persons are in most cases, more than others, saddled with the responsibility of the socio-economic sustainability of their families. With no form of education, it could be adduced that majority of the respondents probably joined the business just to earn a living. However, with no or poor education, they are handicapped, as they lack the proper technical knowledge needed for proper handling, storage and digestion of market information.

It could be adduced that most respondents/traders are basically engaged in the marketing of fruits they know to be consumed and consequently in high demand by the consumers. This allows them the opportunity to maximize return in investment - profit. This again is a clear manifestation of the fact that marketers handle products in high demand by consumers and are in return profitable.

Effect of Technology and Infrastructure Development on Perishable Horticultural Produce

Post harvest handling techniques, in both subsistence and commercialized systems, have been established by trial and error, and these practices are unlikely to change unless it can be proven that new technologies will be more effective and will not impose excessive strain on the social structure, resources and income levels. However, social, political and economic changes are influencing the movement from traditional production patterns to more fully commercialized systems. The resultant effect is often the breakdown of known traditional

systems and, with the considerable variables which influence both the technical and infrastructural components of product handling, it is of little surprise that the reported loss levels are frequently high [21].

Indeed, improper handling and transportation also compounds the problem, since most of these traders do not have good educational background and technical knowhow on how to handle these produce. Consequently, majority of the traders expose the perishable fruits and vegetables to the harsh weather which affects it and leads to deterioration and ultimate spoilage. In this regard, the importance of the proper handling of fruits and vegetables to prevent brushing/ mechanical injuries which leads to rapid deterioration and spoilage has been underscored by variously reported [22, 24, 14, 17].

In this regard, it has been noted that the primary causes of losses have been identified to be mainly biological, microbiological, physiological or physical. Food may be partially consumed or contaminated by rodents, other vertebrates or insects, or infested with nematodes. Perishable foods are particularly susceptible to disease caused by bacteria and fungi, both at pre and post harvest stages. Losses can be caused by the physiological changes which occur during respiration, ripening, senescence, wilting, sprouting and storage at low temperatures or in modified atmospheres. Physical losses occur as a result of cutting, peeling, trimming and freezing of horticultural products. On the other hand, secondary causes of losses are defined as those that lead to conditions which encourage primary losses, such as improper or inadequate harvesting, packing, transportation, storage or processing. There is perhaps undue attention given to the primary causes of losses, with little or no analysis of the supply management situations which contributed to them. Not infrequently losses are incurred because of unfavorable economics at some point in the marketing chain. Conscientious, knowledgeable management is essential in the production, storage and marketing of perishables if losses are to be avoided, and this can only be brought about by increasing educational opportunities, and improving economic incentives for those engaged in its production and marketing activities. Therefore the prevention of losses depends on the control that can be exercised over primary (technological) and secondary (socio-economic) causes of loss [9].

The combination of exposure to moisture and too high or fluctuating temperature may induce microbial attack. Infestation by a particularly destructive group of insect pests and commensally - rodents are also a potential threat to all stored (perishable and durable) products. Together these factors can cause physical loss of weight and lead to chemical changes affecting produce quality. As a consequence both the nutritional and economic value of the commodity is reduced [23].

The processing of horticultural crops to a more durable form is an obvious method of reducing losses. Drying is the least energy and capital intensive method of preservation, followed by canning and then freezing. In developing countries only small amounts of horticultural products are preserved by canning and freezing in view of the high cost of refrigeration facility viz. high cost of the processed products; the very small local markets for them and the nature (epileptic) power supply due to lack of development of infrastructure for its generation [9]. Without a doubt, developing countries have much higher losses in storage, transportation, handling and processing as a result of a lower standard of management, and a very much lower capital investment in transportation, handling, refrigerated storage, or processing facilities [23]. Consequently, agricultural/ horticultural produce such as fruits and vegetables which are sometimes bulky and almost always perishable must be processed

quickly. This means that they are often processed near their areas of production; as such, canneries and refrigerating plants are thus always located within the area of agricultural production [11].

Traders are apt to the use of less expensive means of storage such as baskets and sacks. These are considered to be appropriate storage materials for fruits and vegetables. The evaporative coolant is used less compared to the basket and sack. The refrigerator, though seemingly the most efficient means of storage, is not in use because of the high/or exorbitant cost of purchasing the refrigerating system. Refrigerators are machines that cool the things which are put inside them. They are used in houses to keep foods fresh for several days. Large industrial refrigerators can keep vegetables fresh for several weeks. The use of industrial refrigerators is often called “cold storage”. Perishable agricultural produce under cold storage can be transported over long distances by sea or/and air. A refrigerator cools things to a temperature that is lower than the temperature of the surroundings; that is, the room that the refrigerator is in. In doing this it uses energy. An electric refrigerator uses electrical energy from the main “power supply system” [1]. Incidentally, the refrigerating system, the most efficient means of preservation is not preferred because of its exorbitant cost; coupled with high tariffs on electricity. Where cost is affordable, power supply is epileptic due to an underdeveloped power generation, distribution and supply sector.

In contrast, when compared to one of the developed agricultural country/systems as Israel - with an agricultural sector characterized by an intensive production system, agricultural export (fresh and processed) for 2002 reached \$1.050 billion. Exported fresh produce amounted to \$620 million, mainly to the European Union, while exported processed food products totaled \$430 million. This feat can only be achieved with the aid of developed advanced technologies and infrastructure; which enables the marketing of high quality fruit which can reach the overseas consumer a few days after picking/harvest. Fruits can be stored under refrigeration for long periods. Advanced storage technologies are employed in the cooling houses and sorting and packing facilities as well as in the domestic and export distribution network [8].

Producers and traders encounter a lot of losses due to bad roads during the harvest. As most horticultural produce are perishable which do not last long; there is the need to transport them quickly away from the farmlands located in the hinder lands to markets in urban centers. Over the years roads constructed to serve the farming areas have not been adequately maintained; a times due to inadequate allocation of resources for maintenance. The result is that roads have been allowed to deteriorate to the point where benefits from reduction in post harvest losses are no longer realizable. Therefore improper handling of produce in-transit becomes a serious problem and involves damage to produce in-transit from the farm either to the consumer within a territory or to the port for produce destined for external markets [9]. Also, fragile goods - perishable foodstuffs of high value - are more costly to transport because of the higher insurance coverage and the need for specialized trucks or wagons, e.g. refrigerator trucks - and the possibility of breakage, spoilage or deterioration in transit [11].

Indeed, the importance of roads to the economy of a country is to bring the production of goods and services into closer contact with the market – consumers – for them, where they are bought, processed and consumed. Where there are no roads products can only be carried by people or animals, but this method of transport is slow and only small amounts can be carried/ transported. Therefore, important products such as perishables food produce cannot be moved/ transported over long distances. Cars and Lorries can be used without roads, in a

way, but this is slower, and is more expensive because of damage caused to the vehicles. In fact, in the rainy season many trucks get stuck on bad roads and cannot be used [1].

In Nigeria and other parts of the developing world, the rail transport, compared to the road transport, which is rapid and should be the cheapest and most efficient means of carrying people, large and heavy materials on land, has collapsed and is only gradually being rehabilitated with limited services being run between towns. One railway engine can pull much greater loads than Lorries, and cars, and travels as fast as road transport [1]. Indeed, rail links are more important for bulky items, and it has been argued that, the speed and efficiency of road transport, especially its advantage of door to door transport, are making it more and more important. In addition, the rapid increasing use of containers which can be carried equally well by ships, Lorries or railways will make transport to inland centers more convenient, quicker and relatively cheaper. Ultimately, some high price perishable agricultural produce can stand the cost of air transport [11].

Without a doubt, agricultural development depends on good transportation, and particularly on roads. If there is not enough, good roads, many potential (perishable) agricultural products may not be fully exploited, utilized and/or developed. This means many potential produce which could be exported, or which could be used in substitute for imported foreign products/goods, are not being encouraged to be produced locally. In effect, a country's national and international trade, and general economic relations with other countries, depends largely on its road transport and in general infrastructural development [1].

Perhaps the principle cause of post harvest losses in developing countries lies in the disjointed nature of the links between production, storage and marketing, or the absence of any links at all [9]; and an underdeveloped or total lack or collapsed infrastructure – feeder roads, air and sea ports transport facilities, agro-processing (cold storage) facilities, credit lines financing, marketing facilities, etcetera.

Implication of Lack of Infrastructural and Technological Development on Food, Nutrition Security and Sustainability

Infrastructure is basic physical and organizational structures needed for the operation of a society or enterprise, or the services and facilities necessary for an economy to function. The term typically refers to the technical structures that support a society, such as roads, rail lines, sea ports, air ports, bridges, water supply, sewers, electrical grids, telecommunications, and so forth, and can be defined as the physical components of interrelated systems providing commodities and services essential to enable, sustain, or enhance societal living conditions. Viewed functionally, infrastructure facilitates the production of goods and services, and also the distribution of finished products to markets, as well as basic social services such as schools and hospitals. It is an important term for judging a country or region's development [25, 16]. While Food security, results in adequacy and stability of food supplies and economic and physical access to food as described by FAO. Nutrition security should lead to the protection of old and infirm persons, pre-school children pregnant and nursing mothers from under nutrition and malnutrition [15]. On the other hand, sustainability entails development that meets the needs of the present without compromising the ability of future generations to meet their own needs. And infrastructure is critical to sustainable community development, our future well-being and the day-to-day lives of individuals. The infrastructure we are building today will shape tomorrow's communities. The key infrastructure areas

considered crucial to sustainable development include: energy, transportation, waste management, land use planning and governance [6].

Over time, Nigerian farmers have lamented their pathetic sorry situation without getting any meaningful help from any quarter. Both governments at all levels and the private sector investors have failed to look towards their plight as it seems to mean little or nothing to them, while the situation gets worse by the day. However, of recent the government has indicated its preparedness to address the problem of post harvest losses and this seemed to have raised the hope of farmers. The Nigerian government, through its Minister of Agriculture and Rural Development, in a government policy statement at the 2013 National Agricultural show, in Nasarawa State, announced that: the Ministry of Agriculture has initiated the process to acquire and install temperature-controlled solar-powered warehouses for farmers. A total of 800 modern warehouses will soon be established and every local government will have one warehouse, to be run by farmers and the private sector. For the first time ever, farmers will be able to store their produce for free and reduce post harvest losses [2].

However, the problem of post harvest losses of durable and perishable agricultural produce goes beyond the provision of advanced technological warehouses for storage. Farmers/produces are skeptical at its accessibility, given the fact that there will be only one warehouse available to the whole lot of farmers in a local government. But, beyond these fears, the problem must be seen and addressed in a holistic manner; across the whole commodity value chain system: from pre-production, to production and harvesting, post harvest handling – processing and storage, marketing and infrastructural development. This view is corroborated by [18] who noted that the quantity of infrastructure needed to propel rapid economic development are absent; and concluded that the war of economic transformation through infrastructural development in the country would be lost or won in our settlements where productive economic activities are located; hence physical planning that will propel infrastructural development in major settlements and across regions of the country is germane to the realization of the 20:2020 vision. They recommended adequate funding of infrastructure in critical sector, transparency and good governance, population control amongst others, for the realization of the vision 20:2020. In this light, the Executive Vice Chairman of the National Agency for Science and Engineering Infrastructure (NASENI), highlighted the fact that Nigeria needed \$100 billion to address infrastructure deficit in the areas of road, rail, oil and gas; and from available statistic, Nigeria would apparently not meet the target of Vision 20:2020, since the oil boom triggered off demand for and reliance on importation of infrastructure from foreign countries thereby neglecting indigenous technology and undermining infrastructure development in the country's [5].

In this light, the World Bank is reported to have indicated support for the Federal Government of Nigeria's agricultural transformation programme with \$500 million; in the area of stable crop processing, technologically improved crops and agriculture infrastructure [4]. And locally, the Jigawa State government is executing the construction of a cargo airport at an estimated cost of N11 billion (eleven billion Nigerian Naira); meant to service perishable agricultural products [12].

According to researchers at the Overseas Development Institute, the lack of infrastructure in many developing countries represents one of the most significant limitations to economic growth and achievement of the Millennium Development Goals (MDGs); now Sustainable Development Goals (SDG's). Infrastructure investments and maintenance can be very expensive, especially in such as areas as landlocked, rural and sparsely populated countries in

Africa. It has been argued that infrastructure investments contributed to more than half of Africa's improved growth performance between 1990 and 2005, and increased investment is necessary to maintain growth and tackle poverty [25].

Perhaps the principle cause of post harvest losses in developing countries lies in the disjointed nature of the links between production, storage and marketing, or the absence of any links at all [9]; and an underdeveloped or total lack or collapsed infrastructure – feeder roads, air and sea ports transport facilities, agro-processing (cold storage) facilities, credit lines financing, marketing facilities, etcetera. In realization of this fact, it has been reported that the FAO, IFAD and WFP - the three UN agencies aimed to work together on a \$2.7 million project funded by the Swiss Agency for Development Cooperation to target food losses in developing countries, which can occur during harvesting, processing, transportation and storage as a result of inadequate infrastructure or lack of skills and technology [26].

CONCLUSION

It is evident that the perishable horticultural/ agricultural losses sustained are caused by poor handling in the fields, lack of proper transportation, inadequate dry storage facilities, ineffective cold refrigeration facilities and slow movements of produce; compounded by lack of infrastructural development and/ or poorly maintained infrastructure. The problem of food losses, and particularly post harvest losses, has been with us for a long time, but action at the international level was initiated by the United Nations General Assembly resolution of September 1975, calling for a 50% reduction of such losses on developing countries by the year 1985, and requesting national and international financing and technical cooperation to end the problem, as a matter of priority. Sadly, up to this day the problem still persist and poses a serious challenge to the United Nations (UN's) global Sustainable Development Goals (SDG's) just as it hampered the success of the earlier Millennium Development Goals (MDG's) effort in the fight against hunger, malnutrition, poverty and the desire to significantly increase food production and availability to meet the food and nutrition security needs of an increasing urbanizing populace. Certainly, if this goal is to be achieved, then a reduction of post harvest food losses through improved storage technologies and rapid and colossal investments in infrastructural development must be addressed; as this is central to sustainability. In Nigeria today, post-harvest and infrastructural management of the food production chain remains a major challenge.

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