Why can't I have an Orange? Public-Private sector policy and fresh produce production in Nigeria

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I'm indebted to my husband, Dr. Dada. Thank you honey for allowing me do this, thank you for believing in me, thank you for your immense support.

And to my children, thank you for your understanding and letting mom go when she needs to.

Dedication

To my loved ones: My children and my husband, Dr. O.O. Dada
And to my Redeemer, who gives the will and the strength

Abstract

It is widely believed that healthy diets rich in fruits and vegetables (F&Vs) offer significant benefits for people's well-being. This is based on the tenet that a nourishing diet must contain varieties from several food groups. People's diet often reflects their national food production pattern. In Ogun State (OG), Nigeria, low consumption of F&Vs is attributed to inadequate production of F&Vs. Farmers are not motivated to grow more F&Vs due to lack of economic incentives. This project analyzed the effect of public-private sector policies on production of F&Vs in OG, focusing on land, seed, and safety policies within advocacy coalition framework. The analysis revealed gaps in institutional land, seed, and safety policies that have led to low production of F&Vs. Review of Washington State institutional policies on land, seed and safety with respect to F&Vs production provides insights on modern practices. The results permitted generalizable recommendations that could improve farm F&Vs output in OG.

1.0. Background

Micronutrient malnutrition is a fundamental developmental challenge in Nigeria. This endemic condition has indirectly hindered economic transformation in this country. That this challenge is of global significance is shown by the UNICEF and UN World Food Program (WFP) studies. (UNICEF, 2012., Guatamela-WFP fighting hunger worldwide, 2013). Micronutrient malnutrition is prevalent among low-income populations because they mostly rely on inexpensive sources of calories such as cereals and tubers to meet energy needs (Bouis *et al*., 2011a). Several diseases among rural people have been associated with lack of vital micronutrients such as iron, iodine, zinc, and b-carotene. This has been reported to be the cause of increased mortality rates, especially among women and children; poor pregnancy outcomes; increased morbidity; impaired mental and physical development in children; and reduced work productivity in adults (Black *et al*., 2008).

Healthy diet should contain varieties of nutritious foods including fruits and vegetables. Growing awareness of the nutritional importance of F&Vs is creating increasing desire for dietary diversity and appetite for F&Vs in many developed countries (Conklin et al., 2014; Weinberger, 2005). Though information on the pattern of fruits and vegetable consumption among Nigerians is limited but a case study by Bouis *et al*. (2011a) suggests that they tend to rely more on staple foods to meet their calorie needs. For example, the diet compositions of common foods comprise mainly staple foods like rice, wheat, maize, cassava, and yam (Fig. 1), which are very low in micronutrients (USDA, http://ndb.nal.usda.gov/).

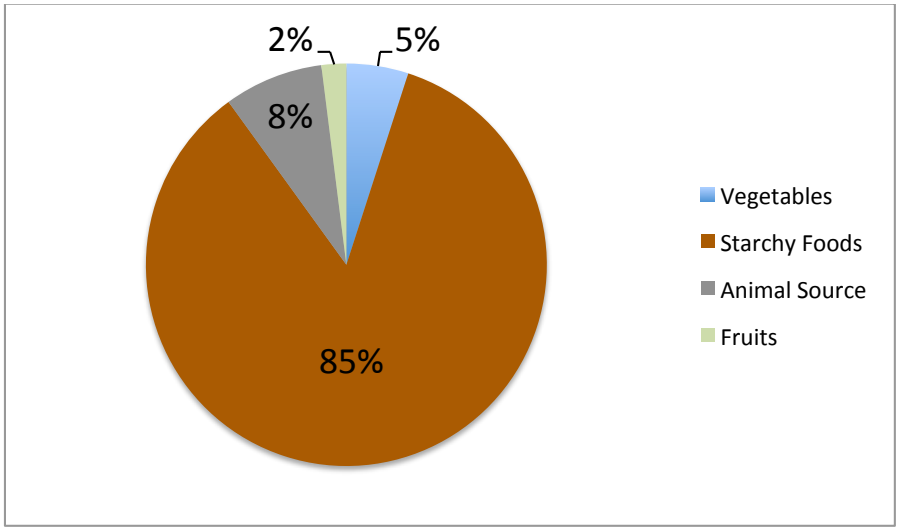

Figure 1A: Current diet pattern in Ogun State, Nigeria.

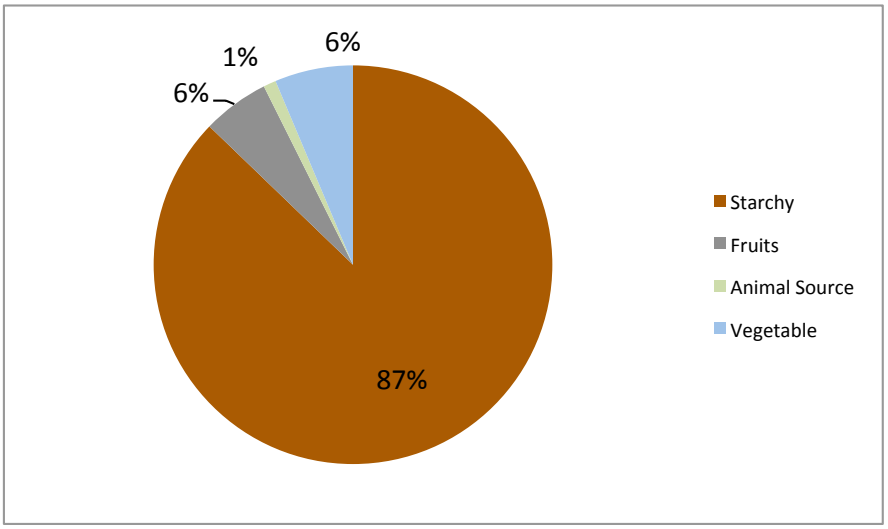

Figure 1B: Current Farm production pattern in Ogun State, Nigeria.

Data source: FAO Statistics (www.faostat.org)

Why is Nigerian diet deficient in F&Vs? Is it because people are not aware of the inherent benefits, or they are culturally indifference, or because the foods are not available? Figure 1A and 1B, clearly show a direct connection between production and diet

pattern; people eat what they produce. Nigeria has large, arable land 85% of the total area that can support year round production of F&Vs, yet farm output for F&Vs has consistently remained low over the years (FAO, 2001). F&Vs have become more expensive and not readily available (Nago, Verstraeten, Lachat, Dossa, & Kolsteren, 2012). Unlike the cereal sector, government intervention on production, marketing and pricing is weak (Idah, *et al.,* 2007). Lack of effective farm to consumer value chain is also contributing to F&Vs scarcity. Other factors including poor rural infrastructure and lack of modern facilities to handle harvest, processing, and preservation contribute to high cost of production and as high as 50% spoilage (Idah, *et al.,* 2007; Asogwa, *et al.,* 2012)

A body of literature suggests that increasing farm production of F&Vs will translate to availability and increased consumption among people (Jones, Shrinivas, & Bezner-Kerr, 2014). In principle, optimal domestic production and marketing system should increase domestic consumption (Graham *et al*., 2007; McIntyre *et al*., 2001). Government has a responsibility to ensure there's adequate supply of F&Vs by encouraging farmers to expand farm size allocated for production and embrace practices that enhance quality and safety. Increased farm yield could also translate to affordable retail price and encourage consumption among people.

Since people are more likely to eat what they produce, increasing farm output of F&Vs should increase their consumption. Given the importance of F&Vs in attaining balanced diet, it is necessary to identify and implement policy instruments that facilitate increased production and availability of these foods by creating effective value-added programs through public-private alliance. Such coalition should be established on strategic interactions among farmers, government, and private produce businesses. Understanding

public-private sector interactions influencing essential production factors such as land, seed, and quality then becomes crucial.

Analysis of public-private sector policies on land-use, seed, and farm safety regulations requires an extensive research effort. However, owing to limited available data on current production and marketing structure in Nigeria, the scope of this paper has been restricted to a high-level assessment of the policy landscape and the impact on F&Vs production. While a more comprehensive study is desirable, the depth of this work should be adequate to enrich our understanding of how public-private institutions can affect production of F&Vs and does support the logic for further debate on the utility of enhanced F&Vs production as a potent tool for improving people's nutrition. The analysis in this work is based on the following assumptions:

1. Consumption of fruits and vegetables improves nutritional status
2. Wholesale and retail facilitate distribution and availability
3. Value added supply chain encourages farm production
4. Rate of consumption increases with production and availability

2.0. Literature Review

2.0.1. Land Use and Management

Among many factors, land represents the primary requirement for farm production. Government policies on land use management could impact the volume of F&Vs grown by farmers. Land use policies define the activities and input that people undertake in a certain land cover, type, to process, produce, or maintain it (FAO, 1997). Although land use and management practices may vary considerably across different countries however, it is

believed that increased allocation or accessibility to land increases production of agricultural produce (Francis, 1987).

2.0.2. Land Zoning:

One mechanism that could increase farm size cultivation for F&Vs is zoning (Routray & Sahoo, 1995). The primary philosophy behind zoning regulation is to separate incompatible property use. For example, keeping large smoke generating refinery away from residential neighborhood. Most remarkably, agricultural zoning maintains the vitality of the agricultural sector by retaining a critical mass of agricultural land and minimizing conflicting uses. This mechanism has been adopted in many US agricultural municipalities to improve increase supply of healthy foods. Schilling *et al* (Schilling, 2014) found positive correlation between farmland preservation and farmers' propensity to increase production in the state of New Jersey. In addition, that study suggests that preserving farm area could improve farmers' economic advantage.

A scholarly search for; "zoning land Nigeria" generated very few hits in context with F&Vs production. Existing land use information is predominantly on ownership control and land economy in urban areas (Famoriyo, 1984; Luning, 1984; Okafor, 1986; Osemwota, 1989). The available information suggests that zoning is not a common concept in Nigeria land management system. Studies show that land allocation for farm production is diminishing due to unregulated land development activities (Francis, 1987). Unplanned urban development is overtaking many farm villages without attempt by the government to preserve or allocate new ones (Francis, 1987).

2.0.3. Land Title and effect on Credit Accessibility:

Access to credit facility and modern technology can facilitate increased production of F&Vs, but many smallholder farmers cannot access bank credits because their lands hold no tenable value for bank loan. Kyomugisha (Kyomugisha, 2008) suggests that land security is crucial for access to credit and technology adoption. Studies have shown that there is direct link between land-rights security and agricultural production (Deininger, Ali, Holden, & Zevenbergen, 2008; Deininger & Byerlee, 2012). Property-rights security will positively affect long-term land-saving investments and induce new episode of large farm growth. More recently, Santos et al findings showed a positive correlation between agricultural production and land security among small holder farmers especially with women (Santos, Fletschner, Savath, & Peterman, 2014).

2.0.4. The Issue of Land Grabbing:

Many African countries are beginning to recognize the importance of agriculture for food security, poverty alleviation, and general development. A common trend in the approach by several governments is allocation of farmland to large-scale offshore investors for production of industrial crops, biofuel, and mineral extraction (Agriculture, 2011). In many cases, lands are sold or leased to investors very cheap or even sometimes free. One reason argued by analysts is that Africa land is empty and available (World-Bank, 2009). The term coined for this emerging trend is "Land Grabbing" (GB) (Zoomers, 2010). Studies conducted so far indicate that Africa is the global spotlight of GB. An estimated 70% of the world's GB is in Africa (ILC, 2011). The food crisis of 2008 exposed the vulnerability of global food security. These led many food-importing countries in Europe, North America,

and East Asia to start seeking secure land and water elsewhere, essentially turning to 'offshore' food production to supply their growing populations. This development can transform the map of food production in Africa, and could impact availability of F&Vs (Deininger et al., 2008; Deininger & Byerlee, 2012).

2.0.5. Seed Availability and Food Security in Developing Countries

Access to quality seeds can impact F&Vs production and availability. Advances in plant breeding and transgenically modified seeds have produce crop varieties with improved yield, resistant to pests, disease, or drought (Andeweg, 1986; Wiggins & Cromwell, 1995). In spite of the advancements, introduction of genetically modified seeds (GMS) has not gained traction in developing countries in reaction to the concerns over safety and ethical issues. The proponents of GMS crop have argued on the potential for future food security, especially in developing countries. They believe GMS crop will increase yield per acre, improve food quality, and extend shelf life, which will benefit both farmers and consumers (Wisniewski, et al, 2002). An opposing argument from the critics of GMS perceived the issue of safety and environmental concern (Phillips, 1994; Malarkey, 2003; Billings, 1999; Longman, 1999; OECD, 1993; Raybould and Gray, 1993; Ellstrand, 1992; Ellstrand and Hoffman, 1990) as critical. Due to this concerns about biological safety, farmers in many developing countries and their government are still reluctant to planting any GM crops. (Azadi & Ho, 2010). While GMS might create possibilities for increasing F&Vs production, the threat over negative perception on adoption of GMS has hindered progress in many developing countries. In particular, African farmers have not yet open-up to adoption of GMS. The vast majority of F&Vs produced are organically grown (Schoonbeek

et al, 2013). Although, organic farming may be shielded from potential risk associated with GMS, intrinsic disadvantages concerning lower yield, labor and cost intensive production (Azadi & Ho, 2010) may undermine the effort to produce more F&Vs or be food sufficient.

2.0.6. The Case of Good Agriculture Practices in Developing Countries

Recently, safety regulation has entered the debate podium on food. In response and recognition of growing food safety concerns by the consumers, the private sector has developed suites of measures to reduce the risk associated with food processing and handling (Amekawa, 2009). Similarly, the recent produce-related foodborne illness outbreak is prompting the development of government food-safety agenda (Kim, 2009). In 2011, the Food Safety Modernization Act was passed by Congress and signed by the President in the United States. The new law requires companies to implement a food safety program that significantly minimizes potential hazards and risk of foodborne illness.
The literature showed that farm regulations and standards could have both positive and negative implications for developing countries. Positively, Henson *et al* argue that regulations serve as a catalyst for trade across different countries or regions (Henson & Loader, 2001; Henson, Masakure, & Cranfield, 2011). Several authors have expressed concerns over the impact of stringent regulation requirements on the volume of F&Vs production (Chen, Yang, & Findlay, 2008; Disdier, Fontagné, & Mimouni, 2008; Jongwanich, 2009; Melo, Engler, Nahuehual, Cofre, & Barrena, 2014; Swinnen & Vandemoortele, 2011). In developing countries, safety standard regulations are still unpopular except among farmers accessing high value export market. While safety regulations are essential to ensure production of safe food, it is possible that its requirements could exclude small

farmers from high value supply market (García Martinez & Poole, 2004). As a result, it might be necessary to identify mechanisms that minimize negative outcome of safety regulations on smallholder productions in the interest of the public accessibility to good foods.

2.0.7. Public or Private Policy Instrument, Which is optimal?

Food availability and accessibility is basically a developmental issue. In considering institutional policy interventions, there are competing models from a socioeconomic standpoint. Among leading economists in development theory, there has been a conflicting view as to whether increase in aid or trade liberalization will be effective in addressing food crisis in developing countries. For instance, Jeffrey Sachs argued that development aid that is "pragmatic with measurable effects" requires practical steps such as the delivery of fertilizer and better seed varieties to African farmers so that they can "increase farm output". From Sachs' ideology, to solve food crises in developing countries will require more aids (Development and cooperation, 2008; Sachs, 2006). To some others, like William Easterly, free market will be the key to increase farmers' productivity and farm output in the region (Easterly, 2007). There is an example of centrally planned market as seen in the case of Brazil and Chile where home grown school feeding program is linked to farm production. The system used structured demand to create market for local landholders through Home Grown School Feeding (HGSF).

Apparently, there's still no consensus approach to address food problems in developing world. However, combination of public and private interventions seems to hold great promises for production and availability of healthy foods. As observed in many

developed countries, government policies can stimulate private sector interventions particularly through nutrition and health base programs. In the US, the government provides a Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) typically redeemed at authorized private retailers (Quirk, Emerson, Husaini, & Hull, 2014; Reicks & Richardson, 2014; USDA, 2014). Recently Zenk and co-worker showed that availability and selection of fresh F&Vs at authorized retailers improved, especially among low-income population, after implementation of USDA's WIC program (Zenk et al., 2012).

Another program in the U.S., 'Fruits & Veggies - More Matters" (www.fruitsandveggiesmorematters.org), by Produce for Better Health Foundation and Center for Disease Control in partnership is implemented to increase the consumption of F&Vs for improving health and well being (Rekhy & McConchie, 2014). While researchers remain cautious to declare the programs as meeting the primary goal of improving nutritional outcome, there is enough evidence that these public/private initiatives have significantly triggered demand for F&Vs. Increase in demand will more likely lead to growers responding with increased production size.

It is also believed that a similar public-private coalition on establishing safety standards could impact F&Vs production. Growers constantly innovate to reduce costs while responding to consumer demand for alternative ways to produce and distribute food such as regional and local food systems (Broderick, Wright, & Kristiansen, 2011; Gilg & Battershill, 1998) and to the resulting shifts in public policy (e.g. USDA, 2013 and Kneafsey et al., 2013). In Africa, new economic reforms are spurring growth in modern wholesale and retail for general consumer goods (Asogwa, and Okwoche, 2012), but it is yet not evident that the government is proactively considering the issues of diet and health

outcome in its policy portfolio to engage the private sector and farmers. Low private sector investment in providing pre-harvest and post-harvest services is assumed generally poor due to preferential predisposition for traditional export cash crops (Poulton, Dorward, & Kydd, 2010; Poulton & Macartney, 2012).

3.0. Methodology and Data Collection

In this research, public-private sector policies and the statutory agency on land, seed, and safety with respect to F&Vs production are examined. The goal is to identify government policies and private mechanisms that motivate farmers to increase F&Vs production with the assumption that consumption of F&Vs will increase as those commodities become more available. Since an extensive study of this subject may require several years of research, and in order to keep the study concise, the scope of the study is therefore limited to how public-private policies on land-use, seed, and safety regulations affects production of F&Vs. To understand the general framework of the current modern system, this research also includes understudying Washington produce farming and related government/private policies. WA was chosen based on convenience. Parameters that influence farmer's decision to produce more F&Vs in Washington State, United States, including institutional policies on land use, seed, and safety regulation as well as the nature of coalition between farmers and the private produce marketers were reviewed. Information on OG's current production conditions was subsequently analyzed. The purpose of evaluating WA system is by no means an attempt to set a control standard for the analysis but to provide insight on proven concepts within its cultural and political boundary. The analyzed variables under each parameter are outlined in Table 1: The

variables were selected based on the likelihood of influencing farmer's decision to grow F&Vs as suggested by literature.

Table 1: List of Variables analyzed.

	Land	**Seed**	**Safety**
1	Land Value/Rent	Cost (% of production cost)	Public policy (GAP & GHP)
2	Land Tenure	Source of seed	Private Sector Specification
3	Land Zoning	Subside Policy	
4	Land share in the production cost	Policy on Seed Quality	
5	F&Vs Acreage	Type (GMO vs. Non-GMO)	

Data for WA were obtained from WA department of agriculture, USDA, Bureau of Land Management (BLM). Information on farmers-private sector cooperation was obtained from news articles, and private produce business websites. Data on OG produce farming policy are limited. This was a major challenge for this study. As a solution, applicable federal farm policy in Nigeria as it stands today, in connection with fruit and vegetable production, were used. The assumption is that Nigerian farm policies are the same at all government levels. The available data were obtained from Food and Agriculture Organization (FAO) database, World Bank Statistics, Nigerian Bureau of Statistics (NBS), OG Bureau of Land (OGSBL).

The original proposal intent was to perform a comparative study of Washington and OG policy instruments that affects production of F&Vs but data on OG was insufficient for a thorough comparative analysis as at the time of this work. Rather, a cross-sectional approach was adopted. Using quantitative and qualitative measures, a descriptive tabulation of data for both regions was generated from the original data set. First, data for

WA was analyzed to identify factors that promote production of F&Vs within the paradigm of advocacy coalition. The knowledge gained from the results of WA analysis, the nominal set, was then used as the reference frame to consider the gaps and recommendations as necessary for improved F&Vs production in OG within the local context. Data for land, seed and safety policies were analyzed independently. The final observation was used to guide our recommendation for changes or improvement needed to advance the supply of fresh fruits and vegetables in Nigeria.

4.0. Results and Analysis

4.0.1. Washington State F&Vs Production Conditions

Table 2 shows the descriptive tabulation of data obtained for each variable on land. In Washington State, produce farm size ranges from 50 acres (small growers) to 2000 acres (large growers). The production is either on a rented farmland or privately owned land. Privately owned farmland is either acquired by purchasing or as family heritage from several generations. For example a family operated farm in North Washington takes full pride in cultivating the land inherited from several generations back. (www. Knutsensfarms.org). WA land tenure encourages private ownership, which creates value addition that enables farmers to present land title certificates for loan applications.

About 30% of WA agriculture land is cultivated to produce F&Vs with an average yield of 6.3 million tones/acre. 30% of F&Vs are produced on rented farmland by small growers. The rent rate is $176/acre on average, which is considered relatively lower than the national average. Whether rented or privately owned, the share of land in the total cost

of production is about 3%. Generally, this is considered reasonable and serves as an incentive to appropriate larger share of land to growing F&Vs.

Table 2: Land

PARAMETER	WA	OGUN
Land		
Land Value/Rent (Agric. farm land)/acre	$2500/$176[1,2]	N48, 000 ($300)[3,4]
Zoning Policy	Yes[2]	N/A
Vegetable acreage	7.8% of total Agric. land	N/A
Fruits acreage	21% total Agric. land	N/A
Production per acre	6.3 million (tons)	N/A
Land tenure	30% of farmland rented as of 2012. 70% cultivated by owners [5]	Customary land tenure. Land Use Decree (LUD) of *1978* [6]
Land share in production cost	3% [7]	Average: 5.2% [9]
Ave. vegetable farm size	50 – 2000 acre [8]	4.5 acre [6]

1. *USDA, 2014 data*
2. *Bureau of Land Management (BLM), http://www.blm.gov*
3. *Local market.*
4. *OG Bureau of Land.*
5. *Economic Research service USDA.*
6. *Food and Agriculture Organization of United Nations (FAO)*
7. *Williegreens.org*
8. *WA State Dept. of Ag (WSDA)*
9. *Local Farmers*

Land zoning is another key factor influencing F&Vs farming in WA. Washington's regulatory zoning under the Management Act preserves land for agriculture by prohibiting subdivision to parcel sizes smaller than would be useful for agriculture. This prevents the fragmentation of agricultural lands. By adopting such rules for land in targeted agriculture zones, it is possible to help assure the availability of land for farming. (American Farmland Trust, WSDA Future of Farming Project). With extra farmland availability, farmers are more likely to increase production of fruits and vegetables.

Table 3: Seeds

PARAMETER	WA	OGUN
Seed		
Cost		
Source	Private growers[11]	N/A
Subsidy policy	There are four categories: 1. Commodity subsidy 2. Disaster subsidy 3. Conservation subsidy 4. Crop insurance subsidy[12]	Fertilizer subsidy
Quality	State wide standard regulated by WSDA	No Regulation
Type (GMO/Organic)	Organic and conventional driven by the market demand.	Mostly organic.
State seed policy:	Grade and market regulated by WSDA[13, 14]	Not Available

10. List of seed suppliers in WA published by WSU vegetable research and extension.
11. USDA EWG subsidy database.
12. WA dept. of Agric.,
13. http://apps.leg.wa.gov/RCW/default.aspx?cite=15.49

Seed is a critical input for F&Vs production. Without it farmers cannot grow. While some fruits, for example apple, do not require seeding, vegetables in general are seeded for every season. Vegetable production flow starts with seedling followed by nurturing, harvest, processing, packaging, and transportation (See APPENDIX I). For the majority of the commodities, seeding is done either in propagation house with vacuum deposition into multi-well tray or directly on the field during summer growing season.

In WA, seeds are typically purchased from private seed producers. Farmers have varieties of options for procuring seeds. There are for examples multiple specialized seed growers published by Washington State University vegetable research and extension services. WSDA regulates the market and the grade produced by the private producers. The market competition also helps to ensure quality. Availability of quality seeds at relatively

low cost is highly desirable by farmers. Cost of seed is considered not a major share of production cost. However, the type of seed is a matter of major consideration. While many farmers continue to produce conventional seeds and have adopted genetically modified seeds, the general trend based on philosophical and ethical practices is rapidly growing among WA growers. The upward trend in organic farming is as a result of the green yuppie clientele especially large in the local market allowing farmers' decisions to be based on getting the biggest bang-for-the-buck. Overall farmers enjoyed strong support from the government and the private producers to meet their seed needs.

Table 4: Safety and Quality Standards

PARAMETER	WA	OGUN
Safety Policy		
Public policy (GAP & GHP). FSMA	Yes[15,16,17,] Food Safety Modernization Act	N/A

15. http://agr.wa.gov/FP/Pubs/docs/181-GoodAgriculturalAndGoodHandlingPractices-Web.pdf
16. http://agr.wa.gov/FP/Pubs/FruitAndVegetablePubs.aspx
17. http://mtvernon.wsu.edu/path_team/FSMA-fact-sheet.pdf

Policy on safety and quality is driven by combination of public and private forces. Government institutions are engaged in regulating farm operations to prevent outbreak of food borne pathogens. Regulatory programs such as Good Agricultural Practices (GAP) and Good Handling Practices (GHP) have been created to promote best agricultural practices to ensure that fruits and vegetables are produced, packed, handled, and stored in the safest manner possible in order to minimize risks of microbial food safety hazards. WSDA operates an audit program to verify that farms use good agricultural practice and/or good handling practice such as requiring processing workers to be code dressed with clean

shoes and aprons or that goods be transported under GAP and GHP conditions. Some of these requirements are perceived by many small growers as economically unsustainable with many claiming that implementing GAP or GHP certified farming is driving up the cost of production significantly. While GAP and GHP currently operates as a voluntary program, they are typically utilized by growers and packers to satisfy contractual requirements with retail and food service buyers. Consumer's awareness on foodborne illnesses has forced the private sector (wholesale and retails distributors) to adopt suites of measures, which farmers must follow. For example, farmers must agree to meet certain quality specifications set by the customer as part of the sales contract. In such cases, farmers are pressured to comply in order to increase their sales value, which takes a tremendous effort and cost for training farm workers to understand the requirements. Although statutory safety regulations are important for insuring foods with no public harm, yet it appears that the associated cost and inconvenience of maintaining high standard farming processes could negatively impact production of fruits and vegetables.

4.0.2. Farmers – Private Sector Alliance

However, farmers and the private sector are forging an alliance to mitigate this compliance challenges with a common objective of producing foods that meet consumer's satisfaction. Wholesale and retail businesses offer varieties of support programs including financing, marketing, and multi-season sales contract to assure net cash in-flow for farmers. For example Whole Foods Market offers local farmers in WA a financial support through loan backing especially during the winter period of general net cash out-flow season (Ref WFM annual report). During this time, stores generally rely on produce from

California to meet demands, but farmers need continuous cash flow in order to keep up preparation for the next growing season. This investment model is primarily on capital expenses (i.e. farm machineries, processing equipment) that hold values as collateral with these loans used to expand and grow the business. Charlie's Produce (C.P.), a Seattle based produce wholesale distributor, also has "Farmer's Own" program to support local growers (www.charliesproduce.com). Charlie's support model is centered on publicity and awareness creation to gain consumer's loyalty for its farmer's products. It was learned also that C.P. frequently support farmers with provision of packaging materials to reduce farmer's direct cost. All of these coalition models are based on trust relationship with mutual respect for all parties involved, and underline the importance of good partnership between farmers and the private businesses. It is particularly beneficial for small growers, allowing them to satisfy the safety and quality criteria and still maintain profitable farming operation.

4.0.3. OG F&Vs Production Conditions

OG is one of the southwestern states in Nigeria, geographically adjacent to Lagos State. The population is 3.7 million with Agriculture being the dominant occupation of its citizens. The main crops produced in the state are roots and tuber crops such as yam, cassava, cocoyam and sweet potatoes, as well as oil palm. F&Vs including mangoes, citrus, pineapple, pepper, and spinach are grown across the states but in fewer amounts. OG farmers are predominantly smallholders cultivating an average of 4.5 acre per household. Though recent data shows increase in farm production but it is mainly for staple foods like Cassava, Maize, Millets, and Rice, which are starchy foods that cannot supply the minimum

nutrient requirement. Production of vegetables and fruits is relatively suboptimal. The proportion of total agriculture land cultivated for F&Vs is not well known due to lack of data. Available information indicates that production is majorly subsistence with many farmers still relying on primitive tools for their operation. Due to lack of post harvest preservation technology, spoilage is as high as 50%. Inadequate rural infrastructure creates a dire condition that hinders produce production. Presently, irrigation is not well developed so almost all seed must be grown in the rainy season and stored for the next year.

OG land tenure system is a mix of customary and constitutional right of occupancy, not right of ownership. According to the provisions of the Land Use Act 1978, all land comprised in the territory of each state in the Federation are vested in the Governor of that state and held in trust and administered for the use and common benefit of people. The Land Tenure only allows statutory rights of occupancy to be granted to other people. The consent of the governor is required before any alienation of interest in land could take place. Customary right of occupancy, according to the Act, means the right of a person or community lawfully using or occupying land in accordance with customary law and includes a customary right of occupancy granted by Local Government under this Act. Local governments were empowered to grant customary rights of occupancy to any person or organization for agricultural, residential and other purposes with the proviso that grants of land for agricultural or grazing purposes should not exceed 500 or 5000 hectares respectively without the consent of the State Governor. Farmlands are typically acquired mostly by allocation through customary right of occupancy. The lack of legal ownership renders land untenable collateral for financial credit facility. Average farmland value

ranges between N48,000.00 ($300.00) to N60.000($375.00)/acre depending on the location. In some cases, land occupants release their land to farmers on contractual agreement for a share of the farm output. Farmers can also rent the land at a rate of N6000.00 ($38.00) but not a common practice.

Land zoning is not a common practice in OG. There is presently no existing zoning policy to preserve agricultural lands. As a result, many people have lost their farmland to housing developments, leading to increasing rural desertification.

4.0.4. Seed in OG

To improve production, the federal and state governments of Nigeria have subsidized fertilizer and seed for many years yet insufficient supply of quality seed is still a major challenge. The local and state ministries of agriculture often buy seeds from companies to give or sell at subsidized prices to farmers. Seed policy is governed by a federal agency known as the National Agricultural Seed Council (NASC), which provides seed producers with foundation seed and quality control. Policy instrument for seed regulation is minimal at the state level. OG has a state funded agricultural extension program through its agricultural development project (ADP) to promote use of certified seeds. Only about 10% of the total state seed requirement comes from certified seed, the rest comes from informal source or farmer-saved seed. Though there is federal statutory policy oversight for varieties of seeds yet seed could be sold without being certified in Nigeria. Farmers, however, continue buying and selling seed in small amounts and most seeds available are for staple root and cereal crops leaving F&Vs sector inadequately supplied.

Quality seed is key to supply of good F&Vs. Advances in seed technology has created more productive, affordable and disease-resistant seeds. F&Vs produced from genetically modified seeds have some advantages such as increased yields, disease resistance, and better quality over conventional seeds however, Ogun growers plants majorly non-GMO seeds. This practice may be partly associated to cultural beliefs that are against synthetically adulterated foods. Lack of good F&Vs seeds may be contributing to limited production and availability of F&Vs in OG.

4.0.5. Safety and Quality policy

Generally, food regulation and safety in Nigeria is less stringent compared to the global standard. The National Agency for Food and Drug Administration and Control (NAFDAC) is the federal agency charged with regulation and control of production and distribution of foods. While the agency's mandate includes setting guidelines on food quality and safety, its activities have focused mainly on imported foods and beverages. In OG, similar to other states in Nigeria, there is no existing or perhaps enforcement of regulatory food safety standard. F&Vs are majorly distributed by traditional open market still characterized by poor handling and packaging, which often render the foods in less quality and unsafe conditions. There are also no market incentives to compel farmers to adopt good agriculture practices since there is no enabling interaction with the private sector as noted in WA produce industry. The relationship between farmers, distributors, and retails is very shallow, offering no synergy to stimulate development in OG.

5.0. Discussion and Recommendations

Land: From the review of WA State public –private interactive effect on F&Vs production, we observed that land policies such as tenure, zoning, and cost impact F&Vs production. Farmland tenure is conducive to tenability to guarantee loans from financial institutions. There is also land-zoning policy that preserves agricultural land areas against competing non-agricultural uses. The review also suggests that farmers are not restricted by initial capital expense on land procurement as many farmers who do could not own land can rent at reasonable cost. Land rent cost constitutes a low percentage of the total production cost.

While OG farmers are also not constrained by the cost of land for F&Vs production, the statutory land policy in OG is considerably unfavorable. The Nigerian constitution only allows right of occupancy with the granting power vested in the state governments. Neither farmers nor individuals have right of ownership on land. Many farmers do not even have the constitutional right of occupancy since the majority of farmland is acquired through traditional customary means. Ordinary farmland values are extremely low due to lack of legal backing. Consequently, farmlands are generally unacceptable by financial institutions as collateral.

Although OG government has no constitutional power to amend or change the existing land tenure act but it has the latitude to implement state policies that could improve the utility of farmland as collateral for financial credit. Presently, the right of occupancy granted by the state government is active for 99 years and tenable for credit access. Pending the federal government action on much necessary rectification to the land

use act, OG government should formulate and deploy awareness program to effectively educate rural people on the benefit of obtaining constitutional right of occupancy on their lands. The state legal system should then require that all land property including farmland be registered with the government regardless of the acquisition channel. The OG government should also review and optimize the process of obtaining the CofO to remove bottlenecks. The bureaucratic process of obtaining CofO should be very straightforward, transparent, and simplified to encourage farmers' participation.

In addition, rural farm community development should be given high priority in OG's budget allocation. Lack of investments in rural infrastructure has led to the rural population been extremely isolated, and about half of the population lacks access to basic social services. This negatively affects farm productivity, prevents economics of scale, and consequently resulted in massive rural/urban migration, and declination of the rural areas. Basic rural infrastructures such as power, road, irrigation, schools and farm related extension services are necessary to stimulate economic development that typically drives land property values.

OG has no land zoning policy. Hence, it is equally recommended to develop and maintain land use/land cover database to enable classification of land covers for guiding allocation of farmland for F&Vs production. A state program specially created to allocate agricultural land for F&Vs would encourage farmers to appropriate more farmland for production of F&Vs. Similarly, the state should establish a state operated database to maintain official farmland value master-sheet to be published regularly. This will increase credibility of farmland as a security instrument for credit facility.

Seed: Access to quality seed is a critical input in the production of F&Vs. WA farmers have access to quality seeds through both private and public driven mechanisms. While private businesses are the primary seed producers the government maintains a regulatory policy to monitor production and distribution of seeds. The combination of these public and private interventions has created an adequate supply of quality seeds when needed. In OG, there is little to no coalition between the government and the private sector on availability of quality seeds. Farmers rely mainly on seed reserved from the previous production year. In many situations, there is no quality assessment or certification for seeds used for production. As a result seeds are planted blindly with limited knowledge of yield, disease resistance, and quality. It is possible that farmers have developed natural mechanism to identify viable seeds through years of experience even without any modern assessment techniques. However, the importance of safe F&Vs in healthy diet is indicative of the need for quality seeds.

The current program overseeing seed quality was recently introduced by the federal government. That program has encouraged few private start-up businesses to start supplying certified seeds. OG government is shadowing the activities of the federal government by buying seeds from the private companies and selling to farmers. Nevertheless the farmers are still widely isolated due to inadequate supply. The problem is further complicated, perhaps with farmer's tendency to adhere strictly to cultural norm of generating seeds the traditional way. To address this challenges, OG government should create programs to educate and assist select farmers to become seed producers. Such program should also include provision of technical assistance to enable farmers to build capacity to produce quality seeds that meet national quality target. Engagement of select

local farmers as seed producers will eliminate cultural barriers and increase like-farmers confidence in certified seeds based on trust and cultural relationship. OG government should also implement a seed price control system to assure designated seed producing farmers are economically productive and protected from 'value inferiority'. The local F&Vs producers should be supported through seed subsidies to promote increased production.

Safety: The analysis of safety policy showed that safety regulation and quality specification have become essential in F&Vs production in WA. Public safety awareness has increased rapidly due to widespread concern of food borne pathogen outbreak among the public. The government has also intensified safety regulatory affairs with implementation of GAP & GHP requirements. Interestingly, farmers, especially small growers consider the burden of implementing GAP and GHP requirements in their production workflow unsustainable, claiming that additional overhead required to maintain safety standard significantly drives up production cost. It is however, widely acknowledged that safety should be taken seriously beginning from seedling to harvesting.

In OG, farmers are not required to implement GHP or GAP framework in production process. In fact, OG government does not have a formal regulatory structure that monitors F&Vs farm production. As noted in this analysis, implementing GAP and GHP is resource intensive. Considering the fact that the majority of OG farmers are small holder growers, mandating them to adhere to GHP and GAP concepts could be overburdening and discourage them from growing F&Vs. Hence, it is logical to recommend deferring adherence to concepts such as GAP and GHP until farmers are more advanced in their operation. This, however, does not suggest a complete elimination of safety consciousness

in the system. It is reasonable to believe that the traditional production system has intrinsic safety mechanism. Given that every farmer holds his product very dearly and is aware of the market implication of less quality produce, some level of safety consciousness is expected to be naturally embedded in the production practices. For example, acceptability of GMO seeds is relatively low due to culturally induced perception of risk expressed in form of safety concern. However, there is a limit to which natural ability of the farmers to prevent inherent safety concerns in F&Vs production. Apparently, policy makers should consider formulating safety and quality monitoring agenda for future implementation.

Standardizing the safety regulation process in OG could be achieved in two ways. Government could provide supports for farmers in terms of technical trainings and equipment to build capacity in modern farming and processing practices. A second approach is to use private sector mechanism, as existed between WA farmers and F&Vs distributor, to facilitate market driven compliance. The challenge with the first approach is the requirement for significant amount of public resources and tendencies to delay enforcement due to farmer's steep learning curve. Alternatively, the state should create enabling atmosphere for private businesses, such as offering tax breaks and duty free on procurement of equipment, to provide third party logistics necessary to stimulate developments in F&Vs production. As the interaction between farmers and private sectors developed, standard safety and quality criteria would spontaneously emerge. Again, private businesses are well equipped to meet the criteria for regulatory specifications. Since they are registered organizations, it will be easier for the government to coordinate monitoring activities with them than with individual local farmers.

6.0. Conclusion and Future Research

Increased production of F&Vs is seen as a viable instrument to encourage consumption of nutrient dense foods in OG. The review of WA production system shows that land, seed, and safety policies as well as the farmers-private sector coalition influences farmers' predisposition to grow F&Vs. The analysis of OG public policies on land, seed, and safety as it stands today shows a need for initiatives to boost production of F&Vs. This study suggests that developing F&Vs farming would require synergistic interaction of both public and private mechanism. OG policy makers need to review and rectify gaps in land tenure system to make farmland tenable for guaranteeing bank loans. Land zoning policy would also increase appropriation of farmland for F&Vs production. Policy on seed should include seed subsidies and support for local farmers to produce more certified seeds. While standardizing safety regulation is critical to public health, the resource requirement of implementing safety criteria is likely to hinder the aim of getting farmers to produce more F&Vs. Enforcing the concepts of GAP and GHP is probably premature with the current status of OG farmers. Nevertheless, a future plan involving promotion of strong farmer-private sector relationship should be considered. Improved production of F&Vs will not only improve nutritional outcome through agriculture, but could also trigger economic developments in rural communities in OG through establishment of agroallied businesses such as food processing plants. Future research will include deeper analysis of the effects of land, seed, and safety policies and the role of government in farmer-private sector coalition on availability of F&Vs in OG.

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APPENDIX I

WA F&Vs production work flow

A typical production workflow involves three core operations: planting, processing, and transportation. In the production flow, farmers first decide what to grow based on what will sell in the market. In a free market, there is no limitation to what farmers can grow. Processing is a critical aspect of the production workflow, which includes; harvesting, sorting, washing, and packaging. Pre-cooling to low temperature (30oC – 55oC depending on the commodity) is critical to remove the field heat within 60 min of harvest. This step is very crucial for produce to retain their prime freshness and quality for an extended shelf life. Pre-cooling to the appropriate temperature extends the shelf life for up to three weeks while vegetables without pre-cooling only last a couple days. Following pre-cooling, the products are then packaged with appropriate materials and then transported on a refrigerated trucks to the customers. Since there is no special preservation technique other than storage under a controlled temperature, produce must leave the farm within 24 – 48 hours and reach the customer quickly in order to maintain high turnover rate. Hence there must be effective transportation mechanism to ensure produce reaches market on time.