

Estimation of Self-Sufficiency on Production and Consumption of Selected Grain Crops in Nigeria

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Abstract: The study estimated the self-sufficiency on production and consumption of selected grain crops in Nigeria. Data was collected from United States Department of Agriculture and analyzed using descriptive statistics and Ordinary Least Squares. The result indicates that the peak growth rate for consumption and production for rice occurred in 1970s (17.70%) and 1980's (13.31%), for maize it was 6.50% and 6.40% in 2000-2009, for wheat it was 18.65% and 21.65% in the 1970's and sorghum was 8.44% and 7.14% in 1990's while the least occurred in 1990s (0.01%) and 1.71% for rice, 2.47% and 2.27% for maize in 1980's, 17.88% (80) and 8.70% (2010-2025) for wheat and 0.90% (2000-2009) and 1.19% (1980s) for sorghum. Result of analysis showed that wheat recorded the highest deficit of -106634 metric tonnes followed by rice (-80209 metric tonnes), maize (-11966metric tonnes) and sorghum (-4526metric tonnes). Sorghum experienced a surplus in 1990s and the highest deficit was experienced in 2010-2019 for all the grains. Also, the self-sufficiency rate declined from 1970s to 2010-2025. It declined from 63.49% to 51%, 96.86% to 94.52%, 1.80% to 1.76% and 99.43% to 97.19% for rice, maize, wheat and sorghum respectively, indicating that Nigeria is not self-sufficient in grain crop production. However, Nigeria was self-sufficient in sorghum production in the 1990s. findings also showed that the long run self-sufficiency rate for rice, maize, wheat and sorghum is 52.92%, 95.40%, 2.28% and 98.43% from 1970 -2025. The balance of 47.08%, 4.6%, 97.72% and 1.57% for rice, maize, wheat and sorghum was met through import. The study recommended that more attention should be placed on production, the rising population and how to counter the excessive import by providing subsidies and inputs to farmers.

Keywords: self-sufficiency, consumption, production, consumption, grains

Introduction: Food production per capita over recent decade has been rising globally even in Africa. There is a global rise in consumption for crops, and a further consumption increase of 59-98% is expected by 2050. FAO estimated that, by 2050, over three billion tones of grains will be used for food and non-food purposes (Mundia *et al.*, 2019, Alexandratos and Bruinsma, 2012). There is an increase in per capita food production in Nigeria, increasing from 27.4 in 1967 to 105.9 in 2020 and 124.6 in 2025. Rice, wheat and maize are three leading food crops in the world; together they directly supply more than 50 per cent of all calories consumed by the entire human population. Human consumption accounts for 85 per cent of total production for rice, compared with 19 per cent for maize (IRRI, 2015). Rice (*Oryza sativa*) is a leading staple crop in Nigeria that is cultivated and consumed in all parts of the country (Ayanwale and Amusan, 2012). Globally, China remains the largest producer of rice with an estimated output of 206,507,400tonnes followed by India (157,200,000 tonnes), Indonesia (70,846,465tonnes), Bangladesh (52,325,620 tonnes) (FAOSTAT, 2019). In Africa, Nigeria is the largest rice producer followed by Egypt. The country produces 8million tonnes of rice out of the Africa average of 14.6million tonnes of rice annually. During the 1960s, Nigeria had the lowest per capita annual consumption of rice in the sub-region at an annual average of 3kg. Since then, Nigerian per capita consumption levels have grown significantly at 7.3% per annum. Consequently, per capita consumption during the 1980s averaged 18kg and then 22 kg in 1995-2000. The Nigerian rice sector has witnessed some remarkable developments, particularly in the last ten years. Both rice production and consumption in Nigeria have vastly

increased during the aforementioned period (Udemeze, 2018). Rice production in Nigeria has been going on in some selected states in the country and about 29 states are currently engaged in the cultivation of rice as part of the plan of the federal government to make the nation an agricultural zone for the production of rice in the world. The land set aside for rice cultivation was increased from the 3.17million hectares to 3.90million hectares from 2016 to 2018 and this brought about an increased total output by 7%. On the other hand, maize (*Zea mays L*) is an important grain in Nigeria and the world at large. It is the second most important grain after rice. The United States is the largest producer of maize accounting for about 347,782 tonnes which represents 33.33% of the World's output followed by China and Brazil. African continents produce about 6.5% of maize in the world. Nigeria is the largest producer of maize in Africa followed by South Africa, with an estimated annual production of about 8 million tones (Ramli, 2016). Its production in Nigeria has appreciated from 1310MT to 12,000MT from 1970 to 2025 with an average growth rate of 6.89% (FAOSTAT). The leading producers in Nigeria are Taraba, Kaduna, Adamawa and Plateau States. Sorghum (*Sorghum bicolor*) is the fifth most produced grain globally and an essential crop in Africa as the grain for millions of people. A regional assessment showed that Africa (24.8million), North America (17.2 milliion) and Asia (8million) are the top sorghum producing regions (USDA, 2016). In Asia, production is dominated by China and India, while in North America, the United States and Mexico are the top producers. In Africa, Nigeria and Sudan are the leading producers of sorghum. Nigeria is the largest sorghum producer in West Africa, accounting for about 71%

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of the total regional sorghum output (Babatunde, 2019). The country is the third largest world producer after the United States and India (FAOSTAT, 2018). It is a primary food crop in the North. Across the World, Wheat (*Triticum aestivum*) is a unique industrial and food grain which ranks third amongst other grains, after rice and maize with global production of accounting for \$159.3bn of global production in 2017 (FDC, 2018). It is the one of the most important grains traded on international markets. Globally, China is the top producer with 134, 340,630 tonnes that accounts for 21.90% of the world's wheat production, followed by India (98,510,000 tonnes), Russia (85,863,132 tonnes), United States (47,370,880 tonnes) and France (36,924,938tonnes) (FAO, 2018). In Africa, Ethiopia (1.7Mha) is the largest producer, followed by South Africa (0.5Mha) while Nigeria accounts for the sixth position. The crop is mostly cultivated in the Northern part of Nigeria. In terms of consumption, Nigeria is the second largest consumer in Sub-Saharan Africa behind South Africa (FDC, 2018). Achieving self-sufficiency in food production has been the central goal of government in developing countries. However, achieving self-sufficiency in production of crops has eluded Nigeria for a long time despite over 50 years of efforts by the Government towards its realization. The economy had to rely on import to bridge the consumption to production gap (Ayanwale and Amusan, 2012). Faced with a growing population and increasing per capita consumption, countries and their policy makers have three options to meet future consumption for crops: increase imports, increase land area and increase production per unit area (Shaibu *et al.*, 2015). Often, growing needs are met through a combination of these three options. Due to market deregulation, price support policies for certain grains like sorghum have often been greatly reduced or just simply eliminated in favor of subsidies for maize, rice and wheat (Egwuma *et al.*, 2019). However, most of the crops are treated as secondary to others and therefore becomes susceptible to variations in the consumption and production of other crops. This makes its production to be significantly influenced by surpluses in another crop. One of the major economic problems facing Nigeria is the shortage of food. Agricultural productivity and total annual food and fiber production in Nigeria are pitiable poor and much below expectation. Nigeria has been feeling the pinch of general food shortage through soaring food prices, particularly since the end of the civil war in 1970. Consequently, the food sufficiency ratio of the country has been dropping from 98% level in the early 1960s to less than 60% in the early 1980s and less than 54% by 1986. All these arose because the standard of Nigerian agriculture has been largely at subsistence level and have been unable to produce food sufficient in quantity, quality and variety for an ever-increasing population. The inability of production to meet up with consumption have been attributed to rising population, rudimentary production techniques, low technological adoption and policy impediments (Oyinbo and Emmaduel, 2012). Government policies and programs in the crop production sector have been relatively unstable and inconsistent in the past decades. In order to enhance its stability make the country self-sufficient in grain production, various programs have been put in place to support grain production over the years and this includes:

Sorghum Transformation Value Chain (STVC), International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), counterpart funding on FADAMA III Programme for grains, Federal Rice Research Station (FRRS), established in 1970, National Accelerated Food Production Project (NAFPP) established in 1972, National Cereals Research Institute (NCRI), launched in 1974, National Seed Service (NSS) in 1975, River Basin Development Authorities (RBDs) established in 1977, Abakaliki Rice Project (ARP) established in 1978, Structural Adjustment Programme (SAP) in 1986, Accelerated Wheat Production Program (AWPP) in 1987, National Grain Production Program (NGPP), Presidential initiative on rice in 2004 to 2007, National Special Programme for Food Security (NSPFES) established in 2002-2005, Agricultural Transformation Agenda (ATA) established in 2011-2015 and Agricultural Promotion Policy (APP) established in 2016-2020. Also, government raised the tariff on imports and closed its border to the movement of goods to curb smuggling which led to economic shock. Despite these efforts a wide gap continues to exist between consumption and production of grains in the country. The fundamental approach for quantifying the values of resources traded in marketplace is the determination of consumer and producer surplus. Consumer surplus is the highest amount of money a consumer would be willing to pay (WTP) for a certain amount of the good, less the amount he actually pays (Jhingan, 2000). Producer surplus and consumer surplus are put in place by economists to determine welfare variations (Angner, 2015). However, comparing both approaches before and after a market disturbance makes it possible to ascertain how the economy is affected (Ramli, 2016). Economist posits that consumers are always trying to maximize their satisfaction by selecting a given amount of good that would maximize their utility with limited income. Consumer surplus and producer's surplus represents different area on demand and supply curve respectively (Agarwal, 2020). Combination of both the consumer and the producer surplus are equal to the over benefit created by the economic interactions between them in the free market. However, consumer surplus has an inverse relationship with consumption; a rise in supply will increase the consumer surplus. The point where there is inefficient supply of product is the deadweight loss. This paper looked at growth rate, the gap between consumption and production and the self-sufficiency rate in the consumption and production of the selected grain crops in Nigeria. There exist a wide gap (deficit) between consumption and production of selected grain crops in Nigeria, a condition which necessitated huge imports of these commodities with billions of dollars spent annually. Studies found that Nigeria is not self-sufficient in grain production arising from many identified challenges facing grain their production.

Materials and Methods: The study area is Nigeria with a total geographical area of 923,768 square kilometers and a population estimate of about 200 million. It is located between latitudes 4^o16' and 13^o 53' North and longitudes 2^o40' and 14^o41' East. Annual time series data was used for the study, with data on consumption and production of the selected grains obtained from United States Department of Agriculture (USDA). The growth rate model was adopted

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from study by Oyinbo and Emmaduel (2012) and used to estimate the growth in selected grains consumption and production from 1970 to 2025. The compound interest

$$Y_t = Y_0(1+r)^t \tag{i}$$

where: Y_t = selected grains consumption and production (metric tonnes); Y_0 = Initial value of selected grains consumption and production (metric tonnes); r = Compound rate of growth of crop consumption and production over time; t = Time trend (1970 to 2025).

Taking the natural logarithm of equation (1), equation (2) was derived as:

$$\ln Y_t = \ln Y_0 + t(1+r) \tag{ii}$$

where: $\alpha_0 = \ln Y_0$, $\alpha_1 = \ln(1+r)$

Equation (2) is rewritten as:

$$\ln Y_t = \alpha_0 + \alpha_1 t \tag{iii}$$

Adding disturbance term to equation (3), the explicit form of the model employed was derived as:

$$\ln Y_t = \alpha_0 + \alpha_1 t + u_t \tag{iv}$$

α_0 = constant term; α_1 = Coefficient of time variable; u_t = Random term. After the estimation of equation (1), the compound rate of growth was computed as follows:

$$r = (e^{\alpha_1} - 1) \tag{v}$$

where: r = compound rate of growth; α_1 = estimated coefficient from equation (1) and e = Euler's exponential factor

Data was analyzed using both descriptive and inferential statistics. The descriptive statistics used were: mean and Tables while Ordinary Least Squares (OLS) was the inferential tool. The Self-sufficiency rate of the selected grains was estimated using the formula in equation (v). Self-sufficiency is defined as a ratio of volume of crop produced locally to the total volume of crop consumed (Jhingan, 2010). The production to consumption ratio (P/C) was used as an indicator of Self-sufficiency.

$$\text{Self-sufficiency rate} = \frac{\text{Production}}{\text{Consumption}} \times \frac{100}{1} \tag{vi}$$

Decision rule: If the P/C =1 or > 1, it means the country is self-sufficient but if its P/C <1, it implies not self-sufficient.

Results and Discussion: Description of consumption and production quantity of selected grains in Nigeria: The estimate of consumption and production of the selected grains is presented in Table 1. The result showed that both production and consumption quantity of the crops increased across the period. The highest was experienced from 2010-2025. The total consumption (production) was 170361 metric tonnes (90152 metric tonnes), 260096 metric tonnes (248130 metric tonnes), 109116 metric tonnes (2482 metric tonnes) and 287749 metric tonnes (283223 metric tonnes) for rice, maize, wheat and sorghum respectively. The minimum consumption and production quantity for rice, maize and wheat was experienced in the 1970s while that of sorghum was in the 1980s. The study revealed that from 1970-2025 sorghum recorded the highest consumption and production with an average consumption (production) quantity of 5754.98 metric tonnes (5664.46metric tonnes) followed by maize with 5201.92metric tonnes (4962.6metric tonnes), rice with 3407.22 metric tonnes (1803.04) and wheat with 2182.32metric tonnes (49.64metric tonnes).

Growth rates of selected grains in Nigeria: The result showing the growth rate in selected crop consumption and production is presented in Table 2. The study indicated a

formula was adopted for developing the model and expressed as:

fluctuation (declining and rising) in the growth rates of the grains over the study periods. Specifically, the estimate of rice revealed that rice consumption declined from 1970 to 1999 and started increasing steadily from 2000 - 2019. The peak growth rate of 17.70% was experienced in the 1970s, while the least of 0.01% was in the 1990s. In terms of production, the highest growth rate was recorded in 1980s with a value of 13.31% while the least was in the 1990s. However, there was an increase in production from 1970 to 1989 and 2000-2019. The increasing growth of rice consumption and production generally could be attributed to population growth, increase in income, increased rice availability and favourable government policies and financial supports. This agrees with findings by Tiarniyu *et al.* (2014). They reported that there was general increase in consumption of rice from 1960-2013. Akande (2012) reported that the demand for rice in Nigeria has been soaring. The growth rate of maize consumption declined from 1980's and 1990's. Negative growth rates of -0.40% and -2.47% was experienced in the 1980's and 1990's respectively. The growth rate increased in 2000-2009 and declined further in 2010-2025. Similar trend was witnessed for maize production, with a decline in growth in 1980's and 1990s while negative growth was recorded in the 1990s. The

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negative growth rate can be attributed to inability of SAP to achieve its objectives and overdependence on oil. The growth rate increased in 2000-2009 and declined further in 2010-2025. The highest growth rate in consumption (6.50%) and production (6.40%) was recorded in 2000-2009. The estimate from 1970 to 2025 indicates a positive growth for consumption (5.02%) and production (5.13%) of maize. Egwuma *et al.* (2019) attributed the increase in the consumption growth rate of maize to population growth, urbanization, industrialization and changing dietary habits of consumers. The growth of wheat declined in 1980s and 2000-2025 with a negative growth rate in consumption experienced in the 1980s. For production, the growth rate declined in 1980s, 1990s, 2010-2025 with negative growth witnessed in the 1990s (-3.73%) and 2010-2025 (-8.70%) respectively. The highest growth rate in consumption (18.65%) and production (21.65%) was recorded in 1970s. Ahmed *et al.* (2011) reported a declining growth in wheat production. The growth rate in consumption and production of sorghum declined in 1980s and 2000-2009 with a negative growth rate in consumption and production experienced in both periods. The decline in 2000-2009 can be attributed to problem of insurgency and destruction of farmland by Fulani herdsmen in the North. The highest growth rate in consumption (8.44%) and production (7.14%) was recorded in 1990s. This indicates that the programs and policies put in place were beneficial within that period. Tahir (2014) reported a decline in growth rate of sorghum from 1983 to 2008. Maikasuwa and Ala (2013) also reported similar findings. The study revealed that rice recorded the highest growth rate in consumption and production from 1970 to 2025 with consumption and production growth rate of 6.70% and 5.87% while sorghum was the least with 2.12% respectively.

Consumption to production gap in selected grains in Nigeria: Table 3 revealed that a significant gap exists between consumption and production of the selected grains. This gap (deficit) is attributed to the increase of consumption over production and rising population. The findings revealed that wheat recorded the highest deficit of -106634 metric tonnes with an average deficit of -2132.68 metric tonnes followed by rice with a total and average of -80209 metric tonnes and -1604.18 metric tonnes, maize with -11966 metric tonnes and -239.32 metric tonnes and sorghum with -4526 metric tonnes and -90.52 metric tonnes. However, across all periods, the highest deficit for the selected grains was experienced in 2010-2025 due to rising population. Sorghum experiences a surplus in the year 1990-1999. The result reveals the main reason Nigeria spend a lot on the import of these grains to meet local consumption. This agrees with findings by Egwuma *et al.* (2019) and Shaibu *et al.* (2015). They all reported that a gap exists between the consumption and production of grains in Nigeria and the gap is bridged through import.

Self-sufficiency rate of selected grains in Nigeria: The relevance of self-sufficiency in grain production cannot be over-emphasized. Table 3 shows a fluctuation in self-sufficiency rate across the study period for the selected crops. Specifically, rice production experienced a decline in self-sufficiency rate in the 1980s (52.21%) and 2000-2009

(41.12%) but increased in 1990s (67.71%) and 2010-2025 (51%). From 1970-1979 and 2010-2025, the self-sufficiency rate declined from 63.49% to 51% indicating that Nigeria is not self-sufficient in rice production. The result agrees with that of Rapu (2016) who reported a decline in self-sufficiency ratio from 99.6% in 1960s to 55.3% in 2013. Similarly, self-sufficiency rate for maize production declined in the 1980s (87.95%) and 2010-2019 (94.52%) but increased in 1990s (97.03%) and 2000-2009 (97.56%). From 1970-1979 and 2010-2025, the self-sufficiency rate declined from 96.86% to 94.52% indicating that Nigeria is not self-sufficient in maize production. Egwuma *et al.* (2019) and Shaibu *et al.* (2015) also reported that a supply gap exists between maize supply and demand. They concluded that the gap is bridged by import. The result of wheat production showed an increase in self-sufficiency rate in 1970s, 1980s and 1990s from 1.80%, 2.67% and 4.08% respectively. However, it declined in 2000-2009 and 2010-2010 from 2.46% to 1.76% respectively. From 1970 - 1979 and 2010-2025, the self-sufficiency rate declined from 1.80% to 1.76% indicating that Nigeria is not self-sufficient in wheat production. Moreso, self-sufficiency rate for sorghum production was high in the 1990s (101.31%) and declined from 97.88% to 97.19% in 2000 - 2009 and 2010 - 2025 respectively. From 1970-1979 and 2010-2025, it declined from 99.43% to 97.19% indicating that Nigeria is not self-sufficient in sorghum production. The long run self-sufficiency rate for rice, maize, wheat and sorghum is 52.92%, 95.40%, 2.28% and 98.43% from 1970 -2025. The balance of 47.08%, 4.6% for rice and maize was imported to meet demand for rice and maize.

Conclusion and Policy Recommendations: The study revealed that there is an increase in the consumption and production of grains in Nigeria over the study period. However, irrespective of the country's potential for grain production and increased growth rates, there exist a gap (deficit) between consumption and production which is bridged through import. It was concluded that Nigeria is not self-sufficient in grain production and until the identified challenges facing grain production are overcome, the sector cannot achieve the desired goal of becoming self-sufficient in grain production. The following recommendations are proffered: adoption of stable and consistent agricultural policies to enhance crop growth and reduce deficit, curbing insurgency and herdsmen attack, reduction in imports, adoption of policy framework aimed at increasing supply of crops should be pursued

References

- Agarwal, P. (2020). Microeconomics: consumer surplus. 3rd Ed; Brooklyn books
- Ahmed, E. Sulaiman, J. and Mohd, S. (2011). Wheat production and economics. *American Journal of Agriculture and Biological Sciences*, 6(3), 332-338.
- Ahmed, F. F. (2015). Economics of wheat marketing in Maiduguri metropolis Borno State, Nigeria. *The International Journal of Social Sciences and Humanities Invention*, 1(1):1-10.
- Angner, E. (2015). Well-being and economics. The Routledge handbook of the philosophy of well-being. London: Routledge. ISBN.978-0.
- Ayanwale, A.B. and Amusan, C.A. (2012) Gender analysis of rice production efficiency in Osun State: Implication for the Agricultural

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Transformation Agenda. Paper presented at the 13th National Conference of the Nigerian Association of Agricultural Economists, Obafemi Owolowo University, Ile – Ife, Nigeria, September 25th – 27th.

Babatunde, A. (2019). Consumers potential demand analysis for local rice consumption in southwest, Nigeria. *International Journal of Mechanical Engineering and Technology (IJMET)*, 10(2): 837-846.

Egwuma, H., Dutse, F., Oladimeji, Y.U., Ojeleye, O. A., Ugbabe, O. O. and Ahmed, M. A. (2019). Demand and Supply Estimation of Maize in Nigeria. *FUDMA Journal of Agriculture and Agricultural Technology*, 5(2): 12-2.

International Rice Research Institute - IRRI (2015). *Rice Production, Course Manual*. Retrieved from www.knowledgebank.irri.org

Jhingan, M. L. (2000). *Microeconomic Theory* Delhi: Vrinda publications

Maikasuwa, M.A. and Ala, A.L. (2013). Trend analysis of area and productivity of sorghum in Sokoto State, Nigeria. *European Scientific Journal*, 9(16), 69-75.

Najafi, A. (2014). Wheat production price performance prediction in the Iranian north province. *African Journal of Agricultural Research*, 9(1), 74 – 79.

Oyinbo, O. and Emmaduel, Y.D. (2012). Empirical Assessment of Growth Rate of Maize in the Pre – SAP, SAP and Post – SAP Periods in Nigeria. *Russian Journal of Agricultural and Socio-Economic Sciences*, 5(5): 23 – 27.

Ramli, M.F. (2016). The application of producer and consumer surplus concept and method in estimating losses caused by marine pollution. *OIDA international journal of sustainable development* 9(2),12-22.

Rapu, S.C. (2016). Evaluating the impact of policies on production efficiency of Nigeria’s rice Economy. *Walden Dissertation and Doctoral Studies*. Walden University.

Shaibu, M. U., Ibitoye, S. J. and Saliu, O. J. (2015). Output Projections for Maize in Nigeria (2015 - 2030), Implication on its Importation). *Current Research Journal of Commerce and Management*, 1(1): 24-28.

Tahir, H. M. (2014). Trend Analysis of Productivity of Some Selected Cereal Crops in Nigeria: 1983-2008. *Research on Humanities and Social Sciences*, 4(8):110-116.

Tiamiyu, S.A., Kolo, I. U., Adewale, G. A. and Ugalahi, U. B. (2014). Trend analysis of milled rice consumption in Nigeria. *International Journal of Agricultural Policy and Research*, 2(10): 329-333.

Udemezue, J. C. and Agwu, A. E. (2018). Improved rice varieties, production technologies and processing constraints in Nigeria. *Direct Research Journal of Agriculture and Food Science*, 6(12): 360-373.

Udemezue, J.C. (2018). Analysis of rice production and consumption trends in Nigeria. *Journal of Plant Sciences and Crop Protection*, 1(3): 1-6.

Appendix

Table1: Selected grains in Nigeria with their estimated consumption and production quantity in metric tonnes.

Year	Rice		Maize		Wheat		Sorghum	
	X	Y	X	Y	X	Y	X	Y
1970-1979	5615	3565	14155	13710	7384	133	36776	36566
1980-1989	16590	8661	21280	18715	12046	321	36326	34984
1990-1999	27667	18179	58314	56579	9807	400	59691	60473
2000-2009	43953	20711	62388	60864	31862	785	86993	85149
2010-2025	76536	39036	103959	98262	48017	843	67963	66051
Total	170361	90152	260096	248130	109116	2482	287749	283223
Average	3407.22	1803.04	5201.92	4962.6	2182.32	49.64	5754.98	5664.46

Source: Computed from USDA data. X and Y = quantity consumed and produced of selected grains in metric tonnes.

Table 2: Growth rates of selected grains in Nigeria.

Year	Rice		Maize		Wheat		Sorghum	
	X	Y	X	Y	X	Y	X	Y
1970-1979	17.70	3.87	5.87	4.81	18.65	21.65	1.21	1.21
1980-1989	8.33	13.31	-0.40	2.12	-17.88	5.65	-0.60	-1.19
1990-1999	0.01	1.71	-2.47	-2.27	11.96	-3.73	8.44	7.14
2000-2009	1.82	3.87	6.50	6.40	6.40	9.64	-0.90	-0.80
2010-2019	3.98	7.25	4.71	4.08	2.43	-8.70	1.61	1.71
2020-2025	6.70	5.87	5.02	5.13	5.23	5.02	2.12	2.12

Source: Computed from USDA data. X and Y = quantity consumed and produced respectively of selected grains in metric tonnes.

Table 3: Estimates of consumption to production gap of selected grains in Nigeria

Year	Rice	Maize	Wheat	Sorghum
1970-1979	-2050	-445	-7251	-210
1980-1989	-7929	-2565	-11725	-1342
1990-1999	-9488	-1735	-9407	782
2000-2009	-23242	-1524	-31077	-1844
2010-2025	-37500	-5697	-47174	-1912
Total	-80209	-11966	-106634	-4526
Average	-1604.18	-239.32	-2132.68	-90.52

Source: Computed from USDA data.

Table 4: Estimate of Self -sufficiency rate of selected grains in Nigeria

Year	Rice	Maize	Wheat	Sorghum
1970-1979	63.49	96.86	1.80	99.43
1980-1989	52.21	87.95	2.67	96.31

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1990-1999	67.71	97.03	4.08	101.31
2000-2009	41.12	97.56	2.46	97.88
2010-2019	51	94.52	1.76	97.19
2020-2025	52.92	95.40	2.28	98.43

Source: Computed from USDA data.