# A Study of Differentials in Imported and Domestic Sourcing of Fish Food in Nigeria

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## ABSTRACT

The fish food obtained from the open market in Nigeria is a combination of local products and foreign products. This is because the country is generally associated with grave deficit in domestic fish production, notwithstanding the supply from imports, and local production from aquaculture practised on marine, brackish and fresh water culture environments, and capture from marine and inland sources. As the country is a littoral state, with an extensive coastline, in addition to a rich endowment of inland waters, it is bewildering that fish importation should become persistent. Policy formulation and execution would certainly profit from an empirical gradation of the various sources of the apparently inadequate fish food. It is in view of this that the paper addresses the twin objectives of estimating the trends and relationship between fish exports and fish production, on the one hand; and establishing the relative significance of imports and domestic output as sources of fish food, on the other. The study relies on secondary data spanning a 39-year time series and sourced principally from the Food and Agriculture Organisation of the United Nations. The methodology adopted is the ex post facto research design of the quasi-experimental research family. Specifically, an ordinary least squares regression was applied in objective one while an equivalence test was done in objective two. The analyses were carried out at a significance level of 0.05. Two critical findings of the study are to the effect that fish exports are directly related to aquaculture and inversely related to capture; and, domestic output is of greater significance than imports in fish food sourcing. These formed the bases for conclusions and recommendations for policy.

**Keywords:** Fish, food, sources, differentials, aquaculture, capture.

## INTRODUCTION

Across the world, aquatic and marine foods, notably fish and fish products, supply 15% of the animal protein demand (Food and Agriculture Organisation, FAO, 2024). More than 40% of the world's population, approximating **3.2 billion people, of which Nigeria is part,** satisfy 20% of their animal protein intake by heavy dependence on aquatic animal foods; the dependency having grown from 15% back in 2010.

In Nigeria, local production stretches from aquaculture practised on marine, brackish and fresh water culture environments, to capturing from marine and inland sources. The inland waterway system is estimated by Sogbesan and Kwaji (2018) to account for 80% of local fish production in the country, though consumption per person is ranked among the lowest. At about 800,000 metric tons, internal fish production is below the 2.7 million tons demand annually, a deficit of 1.9million metric tons ((Akinsorotan et al, 2019; Ukpe, 2020). Nigeria, with this excess demand, resorts to imports. Studies confirm differential consumption of the imported fish in Nigeria, though. After analyses of three rounds of data fairly representative of the Nigerian fish market, and disaggregated on the bases of North and South and urban and rural, Liverpool-Tasie, Sanou, Reardon, &

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Belton, (2021) found that imported frozen fish accounted for 34% of urban fish consumption in the North (23% for rural), compared with 67% in urban areas in the South (54% for rural). Given prevailing national income inequalities and differential distribution of internal crises, the fish consumption disparities were attributed to differences in economic participation access to social infrastructure and ownership of durable consumer goods like refrigerators.

The objectives of this piece are to estimate the trends and relationship between fish exports and fish production in Nigeria; and establish the relative significance of imports and domestic output as sources of fish food in Nigeria.

## MATERIALS AND METHODS

The research design is *ex post* facto. Secondary data from 1980 to 2019 was obtained from the FAO. Objective 1 involved the estimation of linear trends in fish imports and local production; compared algebraically and geometrically.

The second objective involved paired samples equivalence tests between imported and locally produced fish.

For maximum mathematical precision, the *Minitab* Version 18 software was applied all through.

**Model formulation**

The linear trends (1-4) are estimated from the model

$Yt = \alpha + \beta t$ where

Yt is

fish imports in Equation 1,

internal aquaculture production in Equation 2,

domestic capture fish output in Equation 3, and

total Nigerian fish production in Equation 4;

$\alpha$ is the baseline of fish imports in Equation 1 at time period $t = 0$; giving the estimated value of fish imports at the initial starting point or base period;

baseline of internal aquaculture production in Equation 2 at time period $t = 0$; giving the estimated value of internal aquaculture production at the initial starting point or base period;

baseline of domestic capture fish output in Equation 3 at time period $t = 0$; giving the estimated value of domestic capture fish output at the initial starting point or base period; and

baseline of total Nigerian fish production in Equation 4 at time period $t = 0$; giving the estimated value of total Nigerian fish production at the initial starting point or base period.

$\beta t$ is the estimated average change per unit of time t in

fish imports in Equation 1,

internal aquaculture production in Equation 2,

domestic capture fish output in Equation 3, and

total Nigerian fish production in Equation 4.

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# RESULTS

Objective 1

The Fitted Trend Equation for imports came up as

Yt = 29663 + 23916t.....(1)

This means that fish imports started at a baseline of **29,663 tonnes** in 1980 and, on average, **increased by 23,916 tonnes** with every additional year up to 2019.

The Fitted Trend Equation for internal aquaculture production was

Yt = -80097 + 8429t.....(2)

This means that regardless of the negative and meaningless starting baseline of -80097 tonnes in 1980, internal aquaculture production **increased by an average of 8,429 tonnes** for every year up to 2019.

For domestic capture fish output, the Fitted Trend Equation emerged as

Yt = 126511 + 16446t .....(3)

The yield from the estimated function is that domestic capture fish output started with a baseline value of **126,511 tonnes** in 1980 and **increased by an average of 16,446 tonnes** for yearly until 2019.

Total Nigerian fish production – a vertical summation of the aquaculture and capture components, yielded the

Fitted Trend Equation

Yt = 46414 + 24875t.....(4)
From the estimated function (4), total Nigerian fish production began at **46,414** tonnes in 1980 and **grew every year by an average of 24,875 tonnes** until 2019.

Objective 2

Equivalence Test with Paired Data: Total imports (TIMPORT) and total domestic output (TDOMFSH)

Table 1: Descriptive Statistics

| Variable | N | Mean | StDev | SE Mean |
|---|---|---|---|---|
| TIMPORT | 39 | 1.1911 | 1.0000 | 0.16013 |
| TDOMFSH | 39 | 1.8071 | 1.0000 | 0.16013 |

Table 2: Difference: Mean(TIMPORT) - Mean(TDOMFSH)

| Difference | StDev | SE | 95% Upper Bound | Upper Limit |
|---|---|---|---|---|
| -0.61598 | 0.66705 | 0.10681 | -0.43590 | 0 |

*Upper bound is less than 0. Can claim Mean(TIMPORT) < Mean(TDOMFSH).*

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Table 3:Test

| | |
|---|---|
| Null hypothesis: | Mean(TIMPORT) - Mean(TDOMFSH) ≥ 0 |
| Alternative hypothesis: | Mean(TIMPORT) - Mean(TDOMFSH) < 0 |
| α level: | 0.05 |

| DF | T-Value | P-Value |
|---|---|---|
| 38 | -5.7669 | 0.000 |

*P-Value ≤ 0.05. Can claim Mean(TIMPORT) < Mean(TDOMFSH).*

For objective 1, comparison is done by evaluating the estimated t-parameters focusing on Equations 1 and 4. It is seen clearly that imports were rising much faster than local production in the period under review as 24875 > 23916. Part of the explanation for this trend is the susoicion and scepticism associated with fish feed produced locally with such ingredients as millet, cassava and groundnuts (Ayo-Olalusi, Onivie-Ibiyo, Jacob, Obetta, Lamien, & Yossa, 2024; Inichinbia, Ukpaka, & Amadi, 2020).

The corresponding plots – (See Figure 1 and Figure 4 in the appendix) - demonstrate that by the end of the period investigated, import trends had significantly declined while total home production was still high, though reducing.

In the case of objective 2, Table 1 shows that mean imported fish is 1.1911, compared to 1.8071 for domestic production. Table 2 gives the mean difference as 0.61598, which corroborates Table 1. Table 3 is the actual test, yielding P-Value of 0.000 relative to α -level of 0.05. Since $P \leq \alpha$, the conclusion is that the difference between local production and imports is statistically significant. The difference could not be more on account of fish feed limitations imposed by cost considerations (Begho & Irabor, 2024; Fagbenro, & Adebayo, 2005).

## DISCUSSION

Fish consumption in Nigeria makes a major contribution to the protein needs of the population as thrown up by the study. The local production to a level of self-sufficiency, however, has been hampered by a complex of socioeconomic factors. Udoh and Akpan (2019) found the more notorious of the extenuating circumstances would include oil pollution rampant in the delta areas of the country, high feed costs among a population ranked one of the most impoverished in the world, limited access to credit accentuated by very low incomes combined with inadequate access to growing e-banking facilities, exchange rate instability due to excess dependence on petroleum as a dominant foreign exchange earner, and upheavals like heavy internal displacement and refugeeism brought up by banditry, kidnapping and ongoing insurgency.

Other studies also lament the gaps in domestic fish sourcing in Nigeria. Yusuf (2025) is particularly concerned about fish feed deficiencies, citing disincentives in this regard to include declining profit margins to farmers, increased fish prices for consumers with deleterious consequences for fish demand, and the temptation to use low-quality among others.

## CONCLUSION

The analyses reveals that both fish imports and home production have, over the 40-year period reviewed, operated collaboratively to satisfy the demand for fish food in Nigeria. Both were increasing rapidly and later, both began to decrease, with imports dropping off more rapidly.

A second conclusion is that domestic production is of greater importance in meeting Nigerian fish food demands. Imports were only used to augment the local supply.

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# APPENDIX

**Appendix 1: Total imports and exports of fish and fishery products for Nigeria (USD 1000)**

| Year | International trade in fish ($000) | | Internally produced fish in Nigeria (Tonnes) | | |
|---|---|---|---|---|---|
| | Export | Import | Aquaculture | Capture | Total |
| 1980 | 3670 | 455399 | 6028 | 255265 | 261293 |
| 1981 | 10424 | 522091 | 6283 | 253849 | 260132 |
| 1982 | 4502 | 416319 | 6559 | 263156 | 269715 |
| 1983 | 3810 | 366208 | 6842 | 265470 | 272312 |
| 1984 | 4435 | 167954 | 6519 | 257414 | 263933 |
| 1985 | 3291 | 113033 | 7892 | 237461 | 245353 |
| 1986 | 4020 | 89984 | 5456 | 266117 | 271573 |
| 1987 | 4831 | 165856 | 6002 | 254806 | 260808 |
| 1988 | 7606 | 119705 | 10631 | 268883 | 279514 |
| 1989 | 10498 | 150208 | 25840 | 274609 | 300449 |
| 1990 | 14070 | 179641 | 7347 | 308981 | 316328 |
| 1991 | 15590 | 190330 | 15365 | 252340 | 267705 |
| 1992 | 15717 | 277711 | 17088 | 301327 | 318415 |
| 1993 | 10169 | 278057 | 17090 | 238409 | 255499 |
| 1994 | 14090 | 159748 | 15030 | 266202 | 281232 |
| 1995 | 21546 | 146780 | 16619 | 349482 | 366101 |
| 1996 | 18310 | 231844 | 19491 | 337993 | 357484 |
| 1997 | 13856 | 205636 | 24297 | 387923 | 412220 |
| 1998 | 2052 | 184278 | 20485 | 463024 | 483509 |
| 1999 | 10698 | 178124 | 21737 | 455628 | 477365 |
| 2000 | 12472 | 181565 | 25718 | 441377 | 467095 |
| 2001 | 12790 | 451517 | 24398 | 452146 | 476544 |
| 2002 | 17179 | 362582 | 30663 | 481056 | 511719 |
| 2003 | 17933 | 484423 | 30677 | 475162 | 505839 |
| 2004 | 30671 | 503235 | 43950 | 465251 | 509201 |
| 2005 | 56933 | 613497 | 56355 | 523182 | 579537 |
| 2006 | 43739 | 772603 | 84578 | 552323 | 636901 |
| 2007 | 49482 | 892771 | 85087 | 530420 | 615507 |
| 2008 | 72300 | 618062 | 143207 | 601368 | 744575 |
| 2009 | 153267 | 786075 | 152796 | 598210 | 751006 |
| 2010 | 160815 | 973725 | 200535 | 616981 | 817516 |
| 2011 | 100701 | 2048244 | 221128 | 635486 | 856614 |
| 2012 | 100113 | 1450317 | 253898 | 668754 | 922652 |
| 2013 | 263154 | 1213558 | 278706 | 721355 | 1000061 |
| 2014 | 93876 | 1326132 | 313231 | 759828 | 1073059 |
| 2015 | 78782 | 1227873 | 316727 | 710331 | 1027058 |
| 2016 | 60791 | 682858 | 306767 | 734731 | 1041498 |
| 2017 | 51180 | 778030 | 296191 | 916283 | 1212474 |
| 2018 | 53969 | 831665 | 291323 | 878155 | 1169478 |
| 2019 | 00 | 00 | 289543 | 825013 | 1114556 |

Source: Food and Agriculture Organisation of the United Nations (2021): *Fish Stat*

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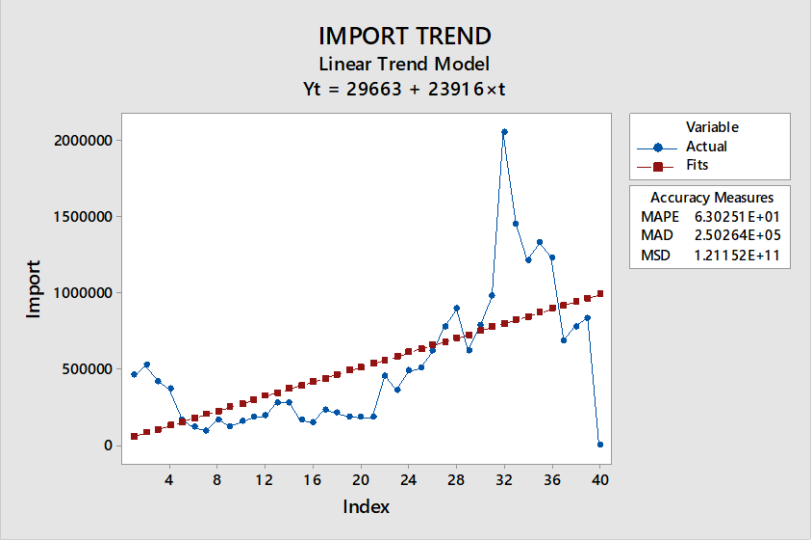
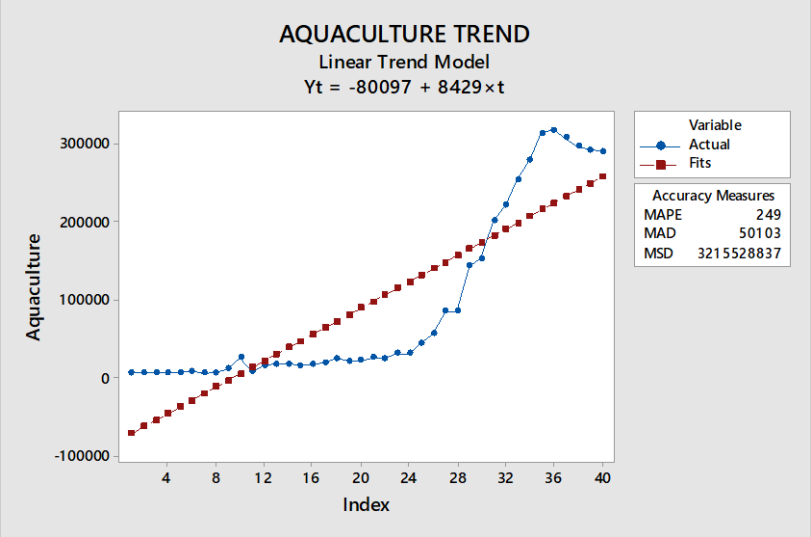
## Appendix 2: Import trend (1980-2019)

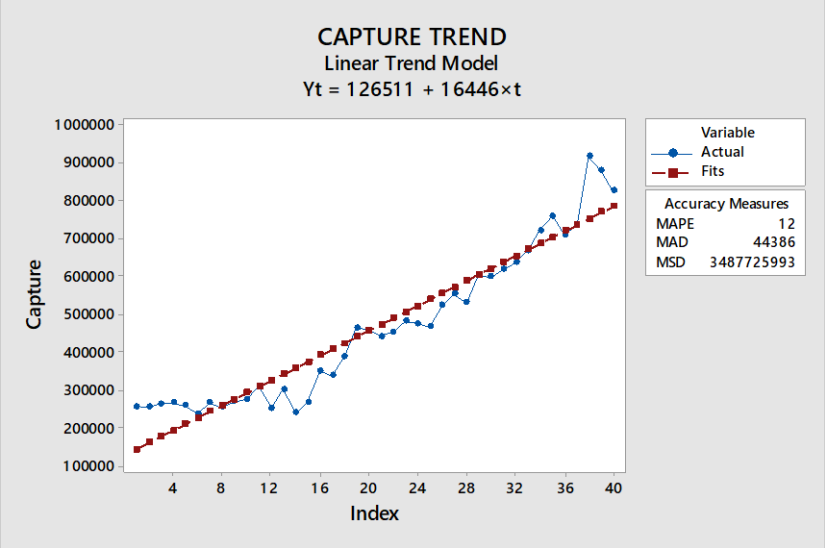



*** NOTE * Zero values of Yt exist; MAPE calculated only for non-zero Yt.**

## Appendix 3: Aquaculture trend (1980-2019)




## Appendix 4: Capture trend (1980-2019)



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## Appendix 5: Total domestic fish trend (1980-2019)