The Role of Aquaculture in Household Food Security: An Assessment of Rural Farmers in Ghana.

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Background

- Aquaculture is responsible for about 50% of seafood consumed by humans.
- Africa has lowest fish consumption in the world.
- Developing countries are striving to increase fish production levels.
- Aquaculture production in Africa has increased from 399,676 tonnes in 2000 to 2,567,427 tonnes in 2010 (FAO, 2010).
- In Ghana, production has increased from 950 MT in 2004 to 27,450 MT in 2012 (FAO, 2015).

AQUACULTURE IN GHANA

- Dominated by small scale subsistence farmers
- Practiced in all 10 regions of the country
- Tilapia and African catfish are the main species farmed with Tilapia constituting about 90% of total farmed fish production.
- Cage production accounted for over 24,000 MT of farmed fish produced in 2012 and less than 2,000 MT from ponds and tanks.
- Production growth as a results of increase in quality fingerlings and feed.

Household Nutritional Challenges

- High mortality rates, malnutrition and high morbidity in Africa.
- Aquaculture as solution to these problems
  - Small-scale aquaculture as a means of income generation, women empowerment and increase food availability.
  - Fish as a source of protein, essential micronutrients and minerals
  - Fish is the main protein source for low-income households in Asia (Dey et al; 2005)

Food Security Metrics

- Different measures of household food security as a result of its dynamic nature (Vigani et al., 2014)
- Common HH food security indicators include HFIAS, HDDS, FCS, HHS, CSI, rCS and SAFS (Maxwell et al., 2013).
- Saaka & Osman, (2013) – Tamale, Ghana : FCS, HFIAS & HDDS
- Kabunga et al (2011) – Kenya : HFIAS
- Nyyssola & Pirttila (2014) – Mozambique : FCS

Objectives

- Measure nutrient adequacy (food security) in terms of dietary diversity of smallholder fish farmers
- Evaluate effects of selected socio-economic factors on food security
- Suggest some policy recommendations for government

Data

- Location: Ashanti & Brong Ahafo regions, Ghana
- Sample: 163 Fish farming and non-fish farming HHs
- Dependent variable: Food Consumption Score (FCS)
- $FCS = \sum y_i f_i$ (1)
- Independent variables: Fish farming, Household wealth, household income, age, mother's education, household size and area.

WFP calculation of FCS

Food Items	Food Groups	Weights
Maize, maize porridge, rice, sorghum, millet, pasta, bread, other cereals Cassava, potatoes and sweet potatoes	Cereals and Tubers	2
Beans, peas, groundnuts, cashew nuts and other nuts	Pulses	3
Vegetables, leave and fruits	Vegetables and fruits	1
Red meat, poultry, eggs, fish	Meat and fish	4
Milk, yoghurt and other dairy products	Milk	4
Sugar and sugar products	Sugar	0.5
Oils, fat and butter	Oil	0.5
Condiments	Condiments	0

FCS Thresholds for grouping households

Profiles	Threshold	Threshold with oil eaten and sugar eaten on daily basis (~7 days/week)
Poor food consumption	0 - 21	0 - 28
Borderline food consumption	21.5 - 35	28.5 - 42
Acceptable food consumption	>35	>42

Methodology

- Two Stage least squares (2SLS)

$$y_1 = \alpha_1 y_2 + \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_n x_n + u \quad (1)$$

- Relevance & Validity of instruments

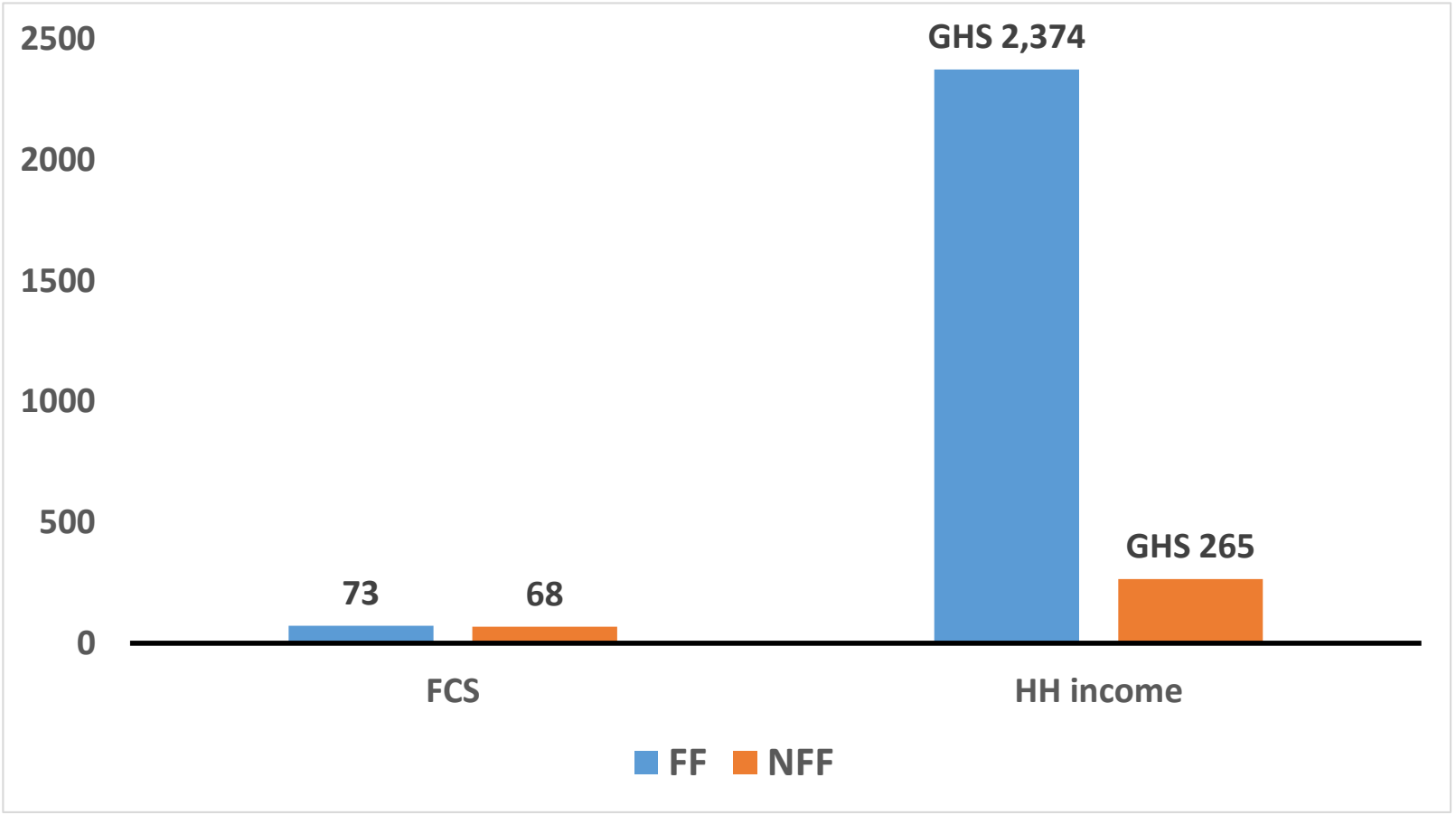
$$corr(z, u) = 0 \ \ but\ corr\ (z, y_2) \neq 0 \quad (2)$$

- Test for endogeneity

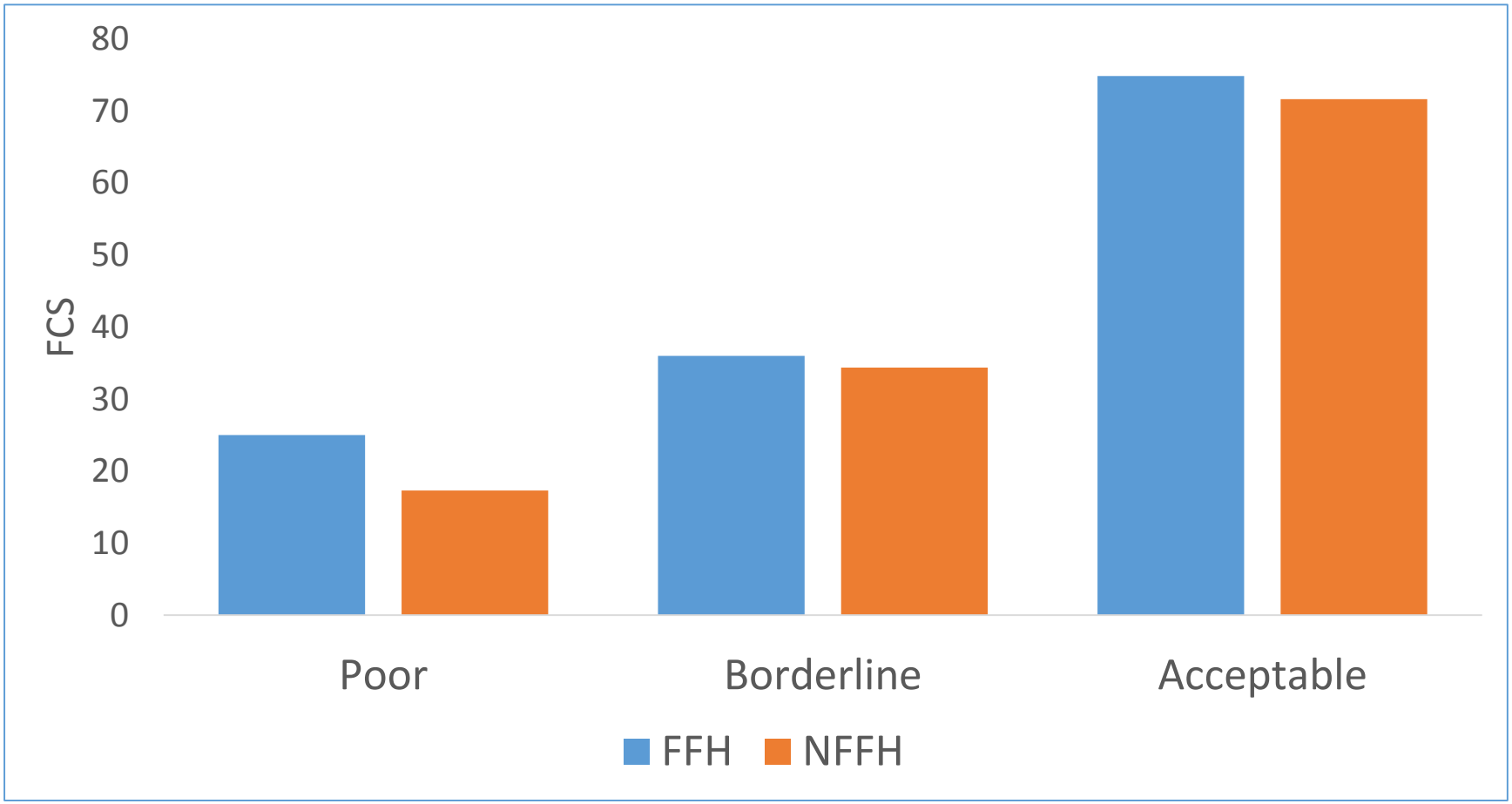
$$DWH = (b_{IV} - b_{OLS}) / \sqrt{(s_{IV}^2 - s_{OLS}^2)} \quad (3)$$

RESULTS AND DISCUSISON

Comparison of HH incomes (GHS) and FCS for fish farming and non-fish farming HHs



Comparison of FCS thresholds for Fish farming and non-fish farming HHs



2SLS Results

Variable	Coefficient	Std. Error	t	P > |t|
Fish farming	2.70	4.19	0.65	0.52
Area	4.95	3.12	1.57	**0.12***
Age	0.03	0.14	0.21	0.83
HH income	0.00	0.00	4.20	**0.00*****
Wealth index	-0.01	0.01	-0.81	0.42
Mother's educ.	0.80	0.32	2.48	**0.01****
Household size	-0.26	0.59	-0.43	0.67
constant	61.68	5.91	10.43	0.00

* = 10% significance level, ** = 5% significance level, *** = 1% significance level

Conclusion

- Fish farming improves FCS – as a result of the ability to purchase variety of foods and also consume fish from own pond.
- Fish farming improves income of households through the sale of fish captured.
- Regression analysis indicate FCS is positively affected by household income, mother's education and area of fish farming.

Policy Recommendations

- ❖ Resource allocation in annual budget to develop aquaculture to enhance job creation and improve supply of fish to local markets.
- ❖ Production and promotion of aquaculture products that will enhance human consumption .
- ❖ Development and use of systems that are suitable for low-value fish affordable for low-income HHs.

Further Research

- Other impact ways through which aquaculture affects household nutrition
- Increase size and area of sample in the future.
- Use a combination of food security indicators to do assessment.

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