



Vitabread: Consumer and baker preferences, economic and nutrition potentials

Francis Kweku Amagloh
fkamagloh@uds.edu.gh



The issue

- Africa has experienced the highest urban growth during the last two decades at 3.5% per year and this rate of growth is expected to hold into 2050
- Projections also indicate that between 2010 and 2025, some African cities will account for up to 85% of the population

<http://www.afdb.org/en/blogs/afdb-championing-inclusive-growth-across-africa/post/urbanization-in-africa-10143/>



The issue

- Urbanisation leads to high demand for ready-to-eat food or minimally processed foods
- Huge processing potential for sweetpotato
 - Shorter growth period (3 - 5 months)
 - Source of starch & micronutrients
 - OFSP adds significant amounts of vitamin A
 - Bakery products, fried products, juices, noodles candies, etc. all in use in Asia



Window of opportunity for SP

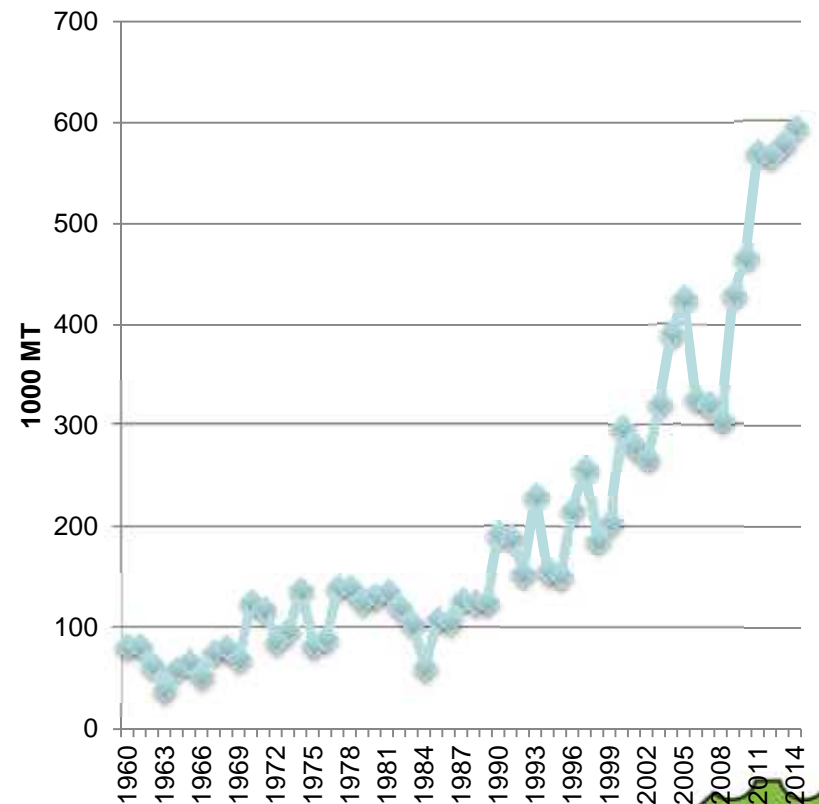


How can we meet the increasing demand for minimally processed or ready-to-eat food products using a nutritious food?



Making Economic Sense

- Wheat importation costs foreign exchange & is rising
- Sweetpotato can be grown in wide range of agro-ecologies by all types of farmers
- OFSP puree can substitute 20-50% of wheat flour in baked products
--for a *healthier* product
- OFSP flour not economically viable (4.5 kg to 1kg flour vs 1.3 kg to 1kg for puree)



Wheat flour importation

[http://www.indexmundi.com/agriculture/?country=gh
&commodity=wheat&graph=imports](http://www.indexmundi.com/agriculture/?country=gh&commodity=wheat&graph=imports)



Objectives

- To assess if consumers and bakers will prefer composite bread containing OFSP (vitabread)
- To refine one of the bread recipes available in Ghana
- To estimate the economic potential of baking vitabread
- To evaluate consumer preference of vitabread
- To determine the vitamin A content of vitabread



Methods

- **Survey in 4 regions in Ghana**
 - Greater Accra, Ashanti, Northern and Upper East
 - Consumers and bakers
- **Benefit-Cost Ratio analysis**
 - Large-, medium-, and small-scale bread bakers in Tamale
- **Consumer preference evaluation**
 - 5-point Likert scale, panel of 100 UDS undergrads
 - (1=least acceptable/dislike extremely and 5=highly acceptable/like extremely)
- **β -carotene assay**
 - Nutrition Department, Noguchi Memorial Institute of Medical Research, on fee-for-service basis



Methods: Vitabread production



Boiling of roots



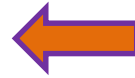
Mashing SP into Puree



Puree & other ingredients



Puree + wheat flour



Kneading



Moulding



Ready for baking



In oven for baking





Vitabread (OFSP puree @ 45% substitution)

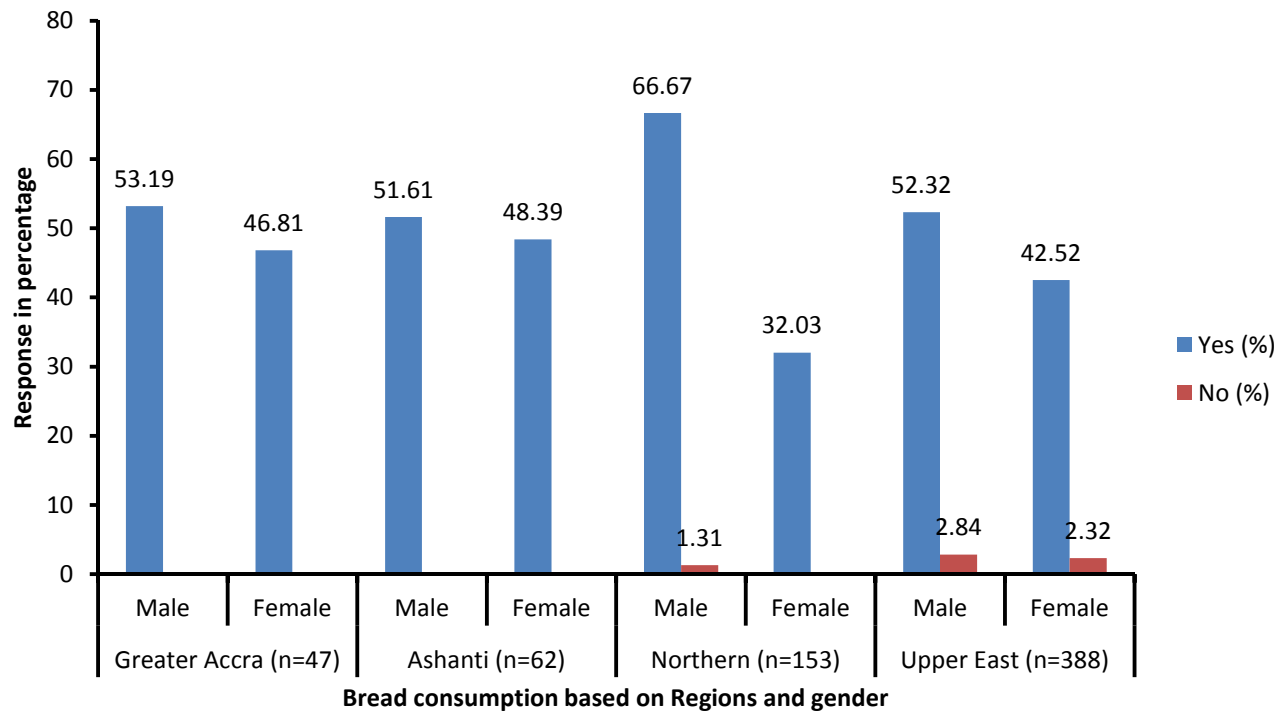


Vitabread, simply yummy!



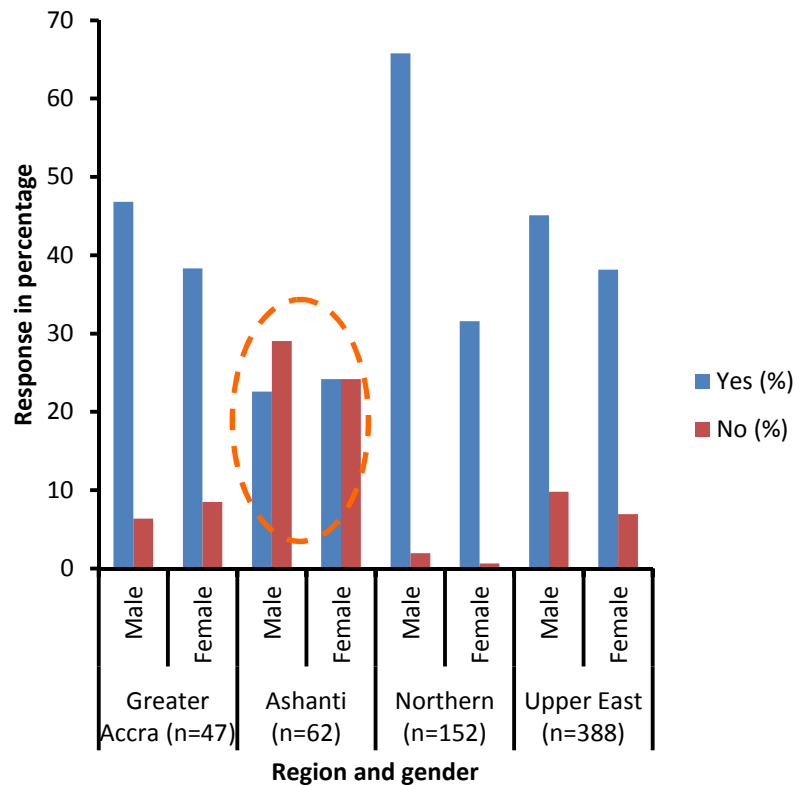
Results & Discussion

Consumption of bread in Ghana

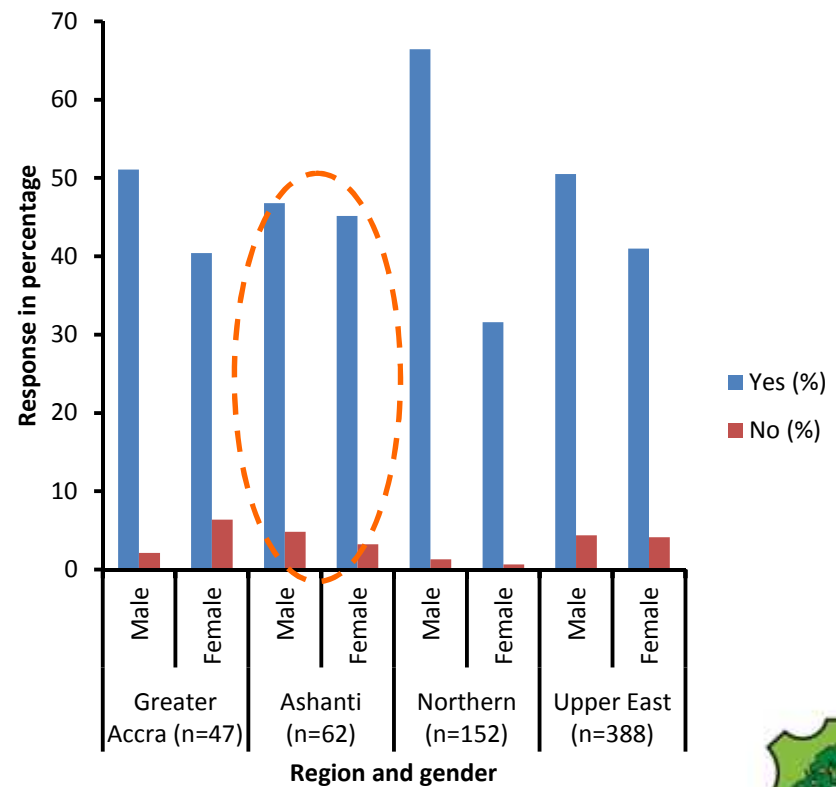


Results & Discussion

Willingness to buy vitabread by consumers

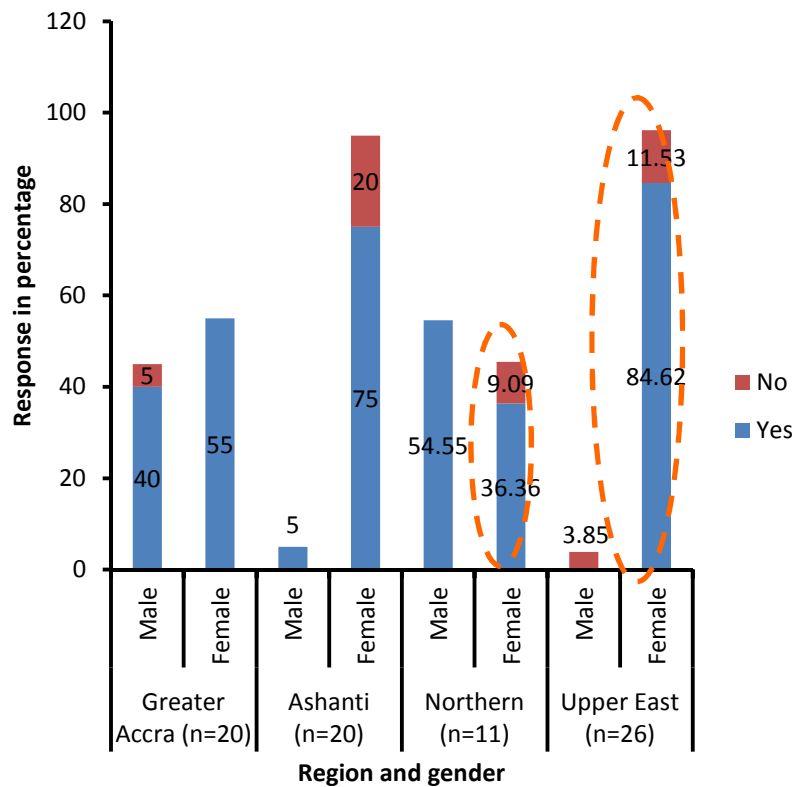


Willingness to buy vitabread by consumers based on health advice

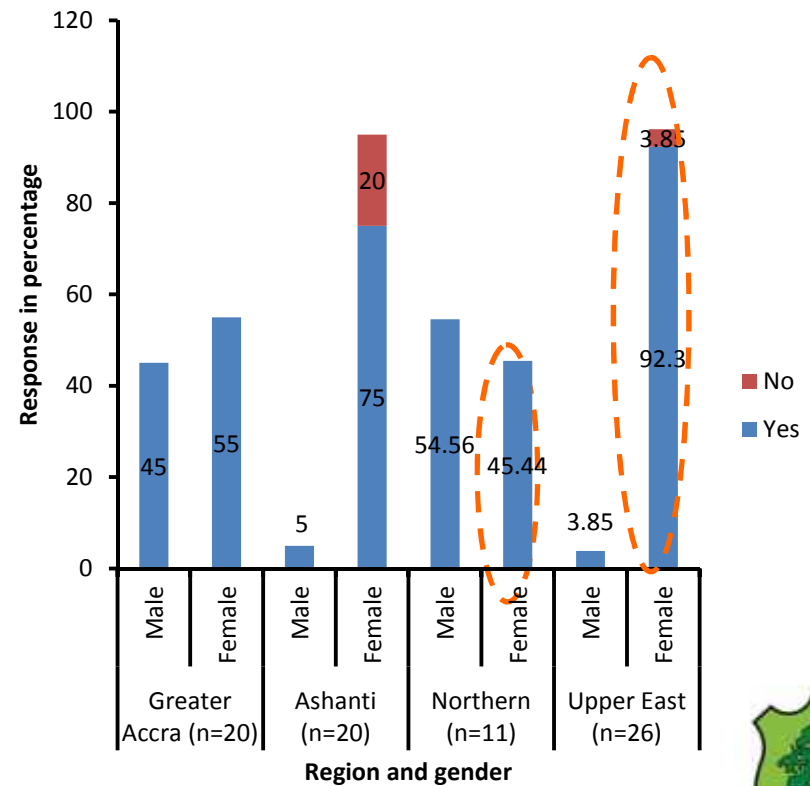


Results & Discussion

Willingness to bake vitabread by bakers



Willingness to bake vitabread by bakers based on health advice



Results & Discussion

Economic analysis on vitabread

	Vitabread (2.2 kg + 1.8 kg OFSP)	White Bread (100% wheat flour)
Total Variable cost (GHC)	20.21	25.95
Number of rolls	38.00	57.17
Unit price per roll (GHC)	0.83	0.58
Revenue (GHC)	23.71	25.47
Net Return (GHC)	3.50	-0.09
Benefit-Cost Ratio (BCR)	1.18	0.99

- BCR = 1.00, means a breakeven venture
- BCR > 1 more profitable
- BCR < 1 less profitable



Results & Discussion

Consumer preference

		Sensory attribute		
Gender	Bread sample	Appearance	Aroma	Overall degree of liking
Male	Vitabread (sugar)	4.33 ^{ab}	4.31	4.35
	Vitabread (no sugar)	4.49 ^{ab}	4.15	4.20
	Wheat (white) bread	4.65 ^b	4.30	4.45
Female	Vitabread (sugar)	4.63 ^b	4.37	4.46
	Vitabread (no sugar)	4.40 ^{ab}	4.50	4.39
	Wheat (white) bread	4.24 ^a	4.21	4.46
	P-value	0.03	0.32	0.81

5-point Likert scale: 1=least acceptable/dislike extremely and 5=highly acceptable/like extremely

RESULTS & DISCUSSION

Bread type	/100 g dry matter basis except for moisture values								
	Moisture (g)	Protein (g)	Fat (g)	Ash (g)	Tot. CHO (g)	Tot. Sugar (g)	Energy (kJ)	Vitamin A (mg)	Lutein (mg)
Vitabread	32.41±1.90	14.75±0.64	11.36±3.92	4.63±0.42	36.85±4.90	29.76±2.00	1297±12	1.57±0.10 (17%) [§]	0.38±0.03
Wheat (white) bread	26.83±0.94	14.67±0.22	8.81±1.50	4.57±0.60	45.11±1.40	27.71±1.50	1342±21	0.26±0.03 (3.0%) [§]	0.06±0.01
P-value	0.12	0.92	0.40	0.94	0.25	0.47	0.25	0.01	0.01

Table 1. Proximate composition, energy, β -carotene and lutein levels in sweetpotato-based bread (vitabread) and wheat (white) bread.

Parameter with $P < 0.05$ indicates that significant difference between the two types of bread;

[§]Value in parenthesis is the percentage of the dietary reference intake per day of vitamin A to meet by a child (1-3 year old) (Food and Nutrition Board, et al., 2004) who will consume 50 g of each bread; Calculation was adjusted to 79% β -carotene retention (Low and van Jaarsveld, 2008), and using a conversion ratio of 12 μg of trans β -carotene = 1 μg of retinol activity equivalents (Food and Nutrition Board, et al., 2004).

Challenges

- Assuring year-round supply
 - Need for improved storage
 - Need for irrigation investment
- Research underway at CIP-SSA for shelf-storable puree without refrigeration
 - Potential breakthrough product for baking industry



The potential not to be undermined,
BUT wouldn't be forever



OFSP processed products will
create markets for farmers,
opportunities for entrepreneurs
& healthier products for
consumers



Conclusion

- Incorporation of OFSP puree would have double advantage:
 - Making bread baking more profitable
 - A good source of dietary vitamin A





Thank You

Career crisis
or ardent
supporter of
the
sweetpotato
value
chain???



Acknowledgement

Funding was received from Jumpstarting of OFSP in West Africa through diversified markets funded this project through a sub grant agreement (SGA 7823-000-00-UDS-01)