

*Creating nutrient-rich foods
through biofortification*
14 December, Ghent University

Consumer perceptions of biofortified foods

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Rationale

- * (GM) Biofortified food
 - = Micronutrient policy intervention
 - = Agriculture based (biotech) intervention

(ex-ante) analyses to estimate market potential

Socio-economic research

Conventional biofortification

GM biofortification

Agronomic biofortification

Micro-level

Macro-level

Economic valuation
(WTP)

Economic evaluation
(CEA/CBA)

Acceptance, Sensory liking, WTP

- * Prevents market failures
- * Important basis for:
 - * Developers, chain actors
 - * Agricultural economists
 - * Policy makers & regulators
 - * Health planners

β -Carotene in Golden Rice is as good as β -carotene in oil at providing vitamin A to children^{1,2,3,4}

Guangwen Tang, Yuming Hu, Shi-an Yin, Yin Wang, Gerard E Dallal,

Bangladesh Approves Confined Trial of Golden Rice

Nov 14, 2013
The Bangladesh Rice Research Institute (BRRI) has received the approval of the National Bio-safety Committee to conduct confined trials of golden rice (genetically modified or GM rice).



Golden rice's lack of lustre

Addressing vitamin A deficiency without genetic engineering



GREENPEACE

Sensory analysis

- * Promising findings
 - * No disliking
 - * even in the absence of nutritional info
 - * Info improves sensory evaluation
 - * Liking often \geq conventional crops
 - * OSP in Uganda (Chowdhury et al. 2011),
 - * Orange maize in Zambia (Meenakshi et al. 2012)
in some districts in Ghana (Banerji et al. 2013),
 - * Yellow cassava in Oyo State of Nigeria (Oparinde et al. 2014),
 - * Iron pearl millet in India (Banerji et al. 2015)
 - * Iron beans in Guatemala (Perez, et al. 2014)
in Rwanda (mixed results)(Oparinde et al. 2015)



Mozambique: Women and children taste and compare different sweet potato varieties

Willingness-to-pay (WTP)

ANNALS OF THE NEW YORK ACADEMY OF SCIENCES
Issue: Staple Crops Biofortified with Vitamins and Minerals

Methods matter: a meta-regression on the determinants of willingness-to-pay studies on biofortified foods

Hans De Steur,^{1,*} Joshua Wesana,^{1,2,*} Dieter Blanquaert,³ Dominique Van Der Straeten,³ and Xavier Gellynck¹

Study	Crop	Nutrient	Breeding technique	Country	Year of data collection	Sample size	WTP estimates extracted
Lusk, 2003	Rice	Vitamin A	GM	USA	2001	574	1
Li et al. 2003	Rice	Vitamin A	GM	China	2002	599	1
De Groote et al. 2008	Maize	Vitamin A	Conventional	Kenya	2003	581	2
Lusk & Rozan 2005	Rice	Vitamin A	GM	USA	2004	501	1
De Groote et al. 2011	Maize	Vitamin A	Conventional	Kenya	2005	500	4
Kassardjian et al. 2012	Apple	Vitamin C	GM	New Zealand	2005	146	1
Deodhar et al. 2008	Rice	Vitamin A	GM	India	2006	712	1
Corrigan et al. 2009	Rice	Vitamin A	GM	Philippines	2006	160	8
Chowdhury et al. 2011	Sweet potato	Vitamin A	Conventional	Uganda	2006	467	8
Depositario et al. 2009	Rice	Vitamin A	GM	Philippines	2006	100	4
Gonzalez et al. 2009	Cassava	Vitamin A	GM	Brazil	2006	414	2
Colson et al. 2011	Broccoli	Vitamin C	GM	USA	2007	98	10
	Tomato	Vitamin C	GM	USA	2007	98	10
	Potato	Vitamin C	GM	USA	2007	98	10
De Steur et al. 2010	Rice	Folate	GM	China	2008	944	1
Naico et al. 2010	Sweet potato	Vitamin A	Conventional	Mozambique	2008	308	8
De Groote et al. 2014	Maize	Protein	Conventional	Tanzania	2008	120	2
Meenakshi et al. 2012	Maize	Vitamin A	Conventional	Zambia	2008	478	5
Banerji et al. 2013	Maize	Vitamin A	Conventional	Ghana	2008	452	6
Kajale 2014	Rice	Vitamin A	GM	India	2009	154	1
De Steur et al. 2013	Rice	Folate	GM	China	2011	251	14
De Steur et al. 2014	Rice	Folate	Conventional	China	2011	251	2
Oparinde et al. 2014	Cassava	Vitamin A	Conventional	Nigeria	2011	671	12
Banerji et al. 2015	Pearl Millet	Iron	Conventional	India	2012	705	3
Oparinde et al. 2015	Beans	Iron	Conventional	Rwanda	2013	572	5

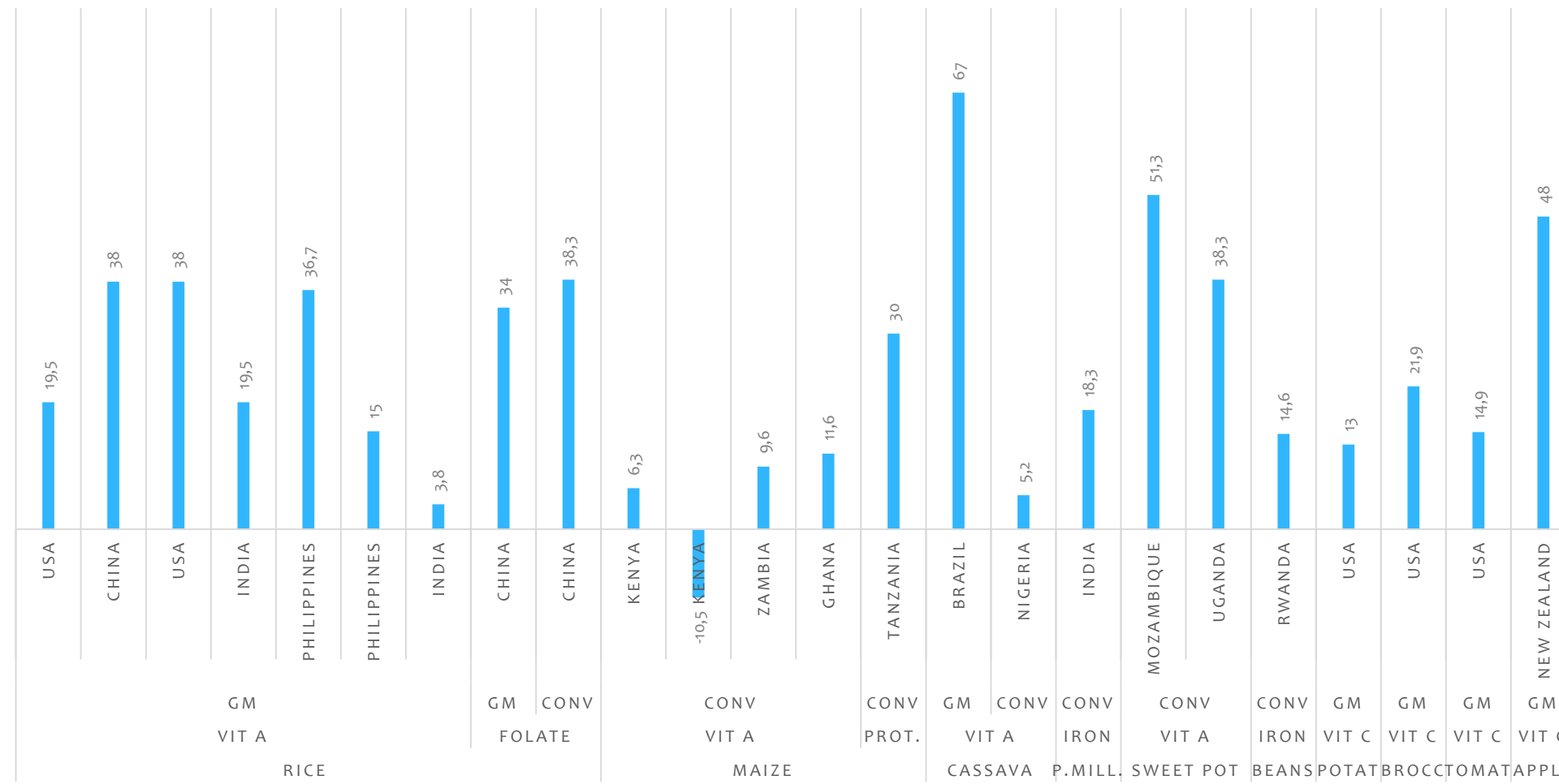
23 studies **10** **5** **2** **14** **2001-2013** **9507** **122**

Willingness-to-pay (WTP)

* Overall: 23.7%

% PREMIUM

(De Steur et al, 2015)



Willingness-to-pay (WTP)

- * Sign. contextual determinants

- * **Staple crops!**

- * **Setting**

- * Urban consumers, lower premiums -> need ?

- * **Breeding technology**

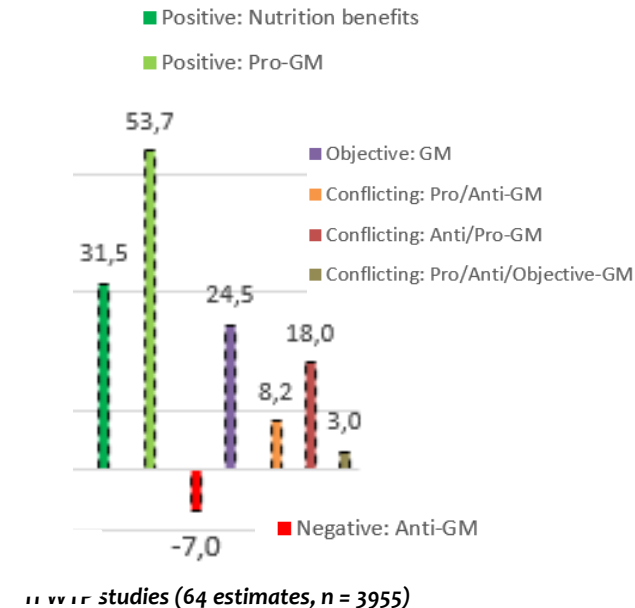
- * *No effect!*

- * Sign. methodological determinants

- * **Type of information**

- * Positive info!

- * **Type of respondent, valuation method, participation fee, ...**



Iodine biofortification

Research report

Stakeholder reactions toward iodine biofortified foods. An application of protection motivation theory ☆



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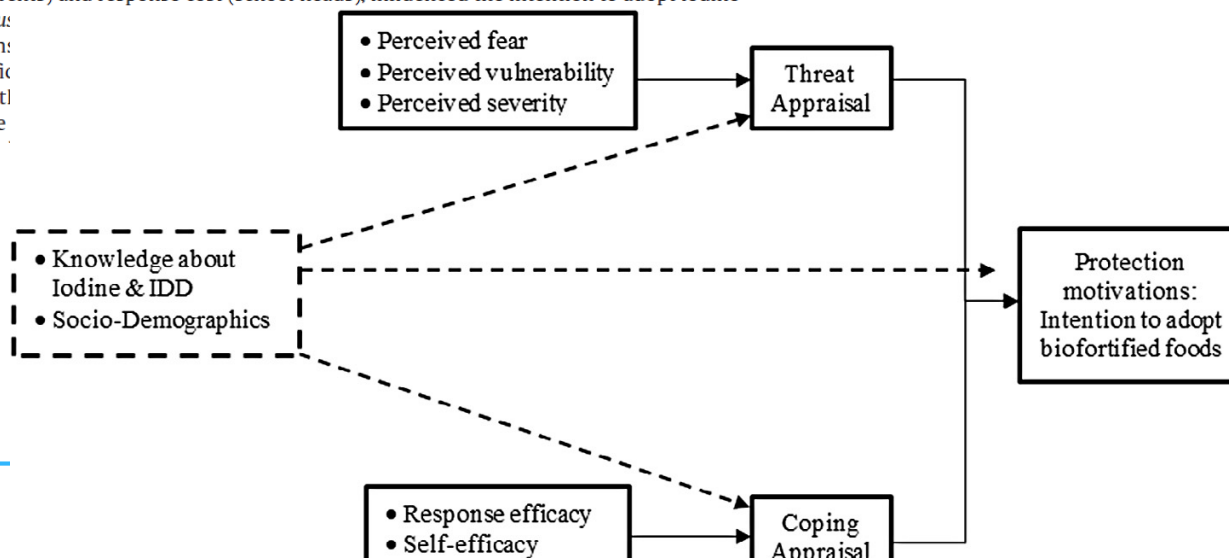
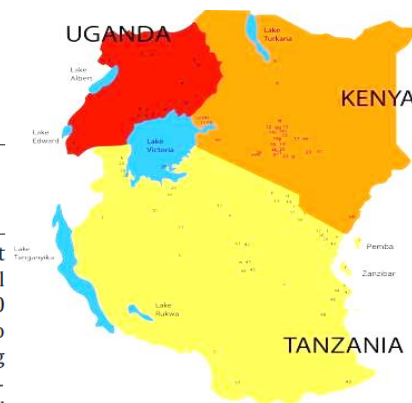
School feeding programs

Stakeholder perceptions

Uganda

ABSTRACT

Objective/Purpose: To use Protection Motivation Theory (PMT) to evaluate stakeholders' intention to adopt iodine biofortified foods as an alternative means to improve children's iodine status and overall school performance. **Methods:** A survey was administered with 360 parents of primary school children and 40 school heads. Protection motivation is measured through matching the cognitive processes they use to evaluate iodine deficiency (threat appraisal), as well as iodine biofortified foods to reduce the threat (coping appraisal). Data were analyzed through Robust (Cluster) regression analysis. **Results:** Gender had a significant effect on coping appraisal for school heads, while age, education, occupation, income, household size and knowledge were significant predictors of threat, coping appraisal and/or protection motivation intention among parents. Nevertheless, in the overall protection motivation model, only two coping factors, namely self-efficacy (parents) and response cost (school heads), influenced the intention to adopt iodine biofortified foods. **Conclu:** to increase not only con- disorders, boost self-effi- tion. The insignificant tl biofortification upon the



WTP ... a growing field



Combining participatory crop trials and experimental auctions to estimate farmer preferences for improved common bean in Rwanda

Kurt B. Waldman^{a,*}, John M. Kerr^a, Krista B. Isaacs^b

Assessing rural consumers' WTP for orange, biofortified maize in Ghana with experimental auctions and a simulated radio message

Online auctions as a research tool: A field experiment on

Coordination with Communication under Oath*

Nicolas Jacquemet[†] Stéphane Luchini[‡] Jason F. Shogren[§] Adam Zylbersztejn[¶]

February 2013

Cognitive biases and design effects in experimental auctions
An application to GM rice with health benefits

Hans De Steur and Filiep Vanhonacker

Department of Agricultural Economics, Ghent University, Ghent, Belgium

Shuvi Feng and Xiaoping Shi

Integration and validation of an SMS-based bidding procedure of eliciting consumers' willingness-to-pay for food

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Anselme Makolha

Conclusions

- * **Findings:**

- * Positive consumer reactions in various regions (> 10% premiums)

- * **Limited focus:** Mostly rice, Asia, vitamins

- * Corn? African market? Minerals?
- * Agronomic/multi-biofortification?

- * **Methods:** Design effects !! Information matters! Taste!

- * **Future research**

- * Bridging the gap between R&D and socio-economic evidence
- * Consumer! ↔ Stakeholder analysis?
- * Biofortification
 - * As a health intervention => WTP in developing countries
 - * As a commercial product => WTP in developed countries

ORANGE-FLESHED SWEET POTATOES



Uganda: Farmers cultivating OFSP for home consumption



Mozambique: Project kiosk to promote and sell OFSP

- * 6 varieties
- * over 55,000 Ugandan farming households
- * up to 237,000 households by 2018

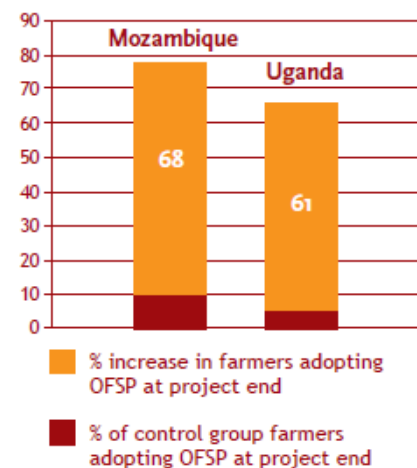


Mozambique: Women and children taste and compare different sweet potato varieties



Uganda: Traders trained on OFSP benefits sell OFSP at a local market

FIGURE 5 Percentage of farmers adopting OFSP at project end, Mozambique and Uganda



**THANK YOU
FOR YOUR ATTENTION !**

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<http://hansdesteur.weebly.com/research.html>