RUFORUM Working Document Series (ISSN 1607-9345), 2021, No. 19 (1): 518-524.
Available from http://repository.ruforum.org

Research Application Summary

Comprehensive baseline study on orange-fleshed sweet potato (OFSP) among children (6-59 months) and women (15-49 years) in Benin: its local processing methods and socio-cultural factors influencing its acceptance

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Abstract

In Benin, women and children barely have access to a balanced diet and are therefore more likely to develop micronutrient deficiencies such as that of vitamin A. Regarding the prevalence of that deficiency, more effective counteractive strategies need to be developed. This study aims at investigating the traditional processing methods of orange-fleshed sweet potato (OFSP), a vitamin A biofortified crop, and identifying factors that influence its acceptance among children (06-59 months) and women (15-49 years) in Benin. A cross-sectional, observational and descriptive study design was used to collect qualitative and quantitative data through a community-based survey (196 households, 71 sweet potato processors); and group sessions (30 sessions with 8-10 participants per session). Quantitative and qualitative data analyses were performed. Frying (83.1%) and boiling (22.54%) were the most recurrent sweet potato processing methods. As for determinants, in internal factors "Knowledge about OFSP" (β=.541; P<0.001) was the best predictor of ''Health behaviour identity'' which in turn was significantly correlated with "Perceived barriers" (β=.-.146; P<0.005) and "Attitudes towards behaviour" (β=.155; P<0.05), both being significant predictors of OFSP consumption but negatively and positively associated with the latter, respectively. In external factors, ''Subjective norms'' (β=.410, P<0.001) were the predictor of OFSP consumption. For participants to adopt positive attitudes towards OFSP consumption: i) health benefits of OFSP consumption should always be included in key messages during any nutritional intervention; ii) flaws related to OFSP agronomics traits and organoleptic characteristics and issues related to its market demand should also be addressed, iii) social organisation and the way of sharing responsibilities of respondents are to be also valued as important. Future research should focus on how effective the above-mentioned predictors are on the rate of OFSP acceptance and consumption.

Keywords: Benin, community based-survey, external factors, internal factors, OFSP consumption, predictors, Vitamin A

Résumé

Au Bénin, la carence en vitamine A fait partie de l'une des carences en micronutriments les plus récurrentes chez les femmes et les enfants en raison de l'alimentation peu diversifiée de ceux-ci. Face ce fléau qui devient de plus en plus prévalent, il urge de développer des stratégies de lutte plus efficaces. La présente étude vise à renseigner les méthodes traditionnelles de transformation de la patate douce a chair orange (PDCO une culture bio-fortifiée en vitamine A) et à identifier les

facteurs qui influencent son acceptation chez les enfants (06-59 mois) et les femmes (15-49 ans) au Bénin. Un schéma d'étude observationnelle descriptive transversale a été mise en œuvre pour collecter des données qualitatives et quantitatives aux moyens d'une enquête communautaire (196 ménages, 71 transformatrices de patates douces) et de discussions de focus group (30 sessions avec 8-10 participants par session). L'analyse de données a connu deux volets : quantitatif et qualitatif. La patate douce était le plus souvent frite (83,1%) ou bouillie (22.54%). Pour ce qui est des déterminants de la consommation de la patate douce, la « connaissance de la PDCO » (β=0,541 ; P<0,001) était le meilleur déterminant de « l'identité par le comportement en santé ». « L'identité par le comportement en santé » était significativement corrélée aux «barrières perçues » (β=. -0,146 ; P<0,005) et « Attitudes par rapport au comportement » (β=0,155 ; P<0,05), toutes deux déterminants significatifs de la consommation de la PDCO mais développant respectivement une association négative et positive avec elle. Parmi les facteurs externes, les « normes subjectives » (β=.410, P<0.001) étaient le déterminant de la consommation de la PDCO. Pour que les participants adoptent des attitudes positives par rapport à la consommation de la PDCO : i) les effets bénéfiques de consommation de la PDCO doivent être intégrés aux messages clés au cours des interventions nutritionnelles; ii) les défauts liés aux caractéristiques agronomiques et organoleptiques de la PDCO et les problèmes liés à la demande du marché doivent être respectivement corrigés et résolus, iii) l'organisation sociale et celle de partage de responsabilités dans le ménage doivent également être prises en compte. Pour les études à venir, l'efficacité des déterminants mentionnés ci-dessus sur le taux d'acceptation et de consommation de la PDCO doit être testée.

Mots clés: Bénin, déterminants, enquête communautaire, facteurs externes, facteurs internes, consommation de la PDCO, Vitamine A

Introduction

Vitamin A is an essential nutrient whose deficiency is recurrent among young children and women in low-income countries. Of the strategies developed to address it, biofortification of staple foods with micronutrients proved to be a sustainable approach as it benefits people in rural and remote areas with limited access to supplementation or fortified food products (Bouis *et al*., 2011).

Sweet potato is a good source of micronutrients such as pro-vitamin A and vitamin C (Suárez *et al*., 2016). It varies in colour and so does its carotenoid concentration. For the orange variety, the darker the orange colour, the more beta-carotene present. It was shown that the consumption of orange-fleshed sweet potato (OFSP) can result in increased circulating beta-carotene and a positive moderate effect on vitamin A status (Hotz *et al*., 2012). In practice OFSP is either boiled, steamed, fried or dried or microwaved or roasted (Eke-Ejiofor and Onyeso, 2019).

In Benin, the sweet potato value chain is still at the embryonic stage regardless of its widely acknowledged effectiveness in the prevention of vitamin A deficiency. The objectives of this study are to investigate traditional culinary methods and identify factors influencing the acceptance of OFSP among children (6-59 months) and women (15-49 years).

The study applied a cross-sectional, observational and descriptive study design to collect qualitative and quantitative data. The areas of Alibori, Atacora, Mono, Couffo, Atlantique and Oueme were selected due to their high level of sweet potato production.

Methodology

Quantitative design. Overall, 196 households were surveyed. The household sample selection criterion was the presence of at least one child of 6-59 months of age. Within each household, the mother (15-49 years) – child (6-59 months) pair was randomly selected. Anyone who processes the sweet potato, whether for home consumption or commercial purposes, was considered a sweet potato consumer. Seventy-one (71) sweet potato processors were selected following a convenience sampling. Data collected were about sweet potato local culinary methods and behavioural determinants of the consumption of sweet Potato/orange-fleshed-sweet potato.

Qualitative design. Focus group sessions were held in the areas of Atlantique, Mono, and Alibori that were selected based on the quantitative design results. Participants shared the same characteristics: age range, gender, ethnic group. They were divided into two groups: women's group and men's group. Four sessions were held per group with 8-10 participants per session. An additional session per group was held after reaching theoretical estimated saturation to be sure that 'new' information was not missed. In all, 30 focus group sessions were held. Socio-cultural factors influencing the acceptance of the orange-fleshed sweet potato were investigated during the sessions.

Quantitative data were first checked for completeness and consistency. Then data were coded and entered into the computer using SPSS statistical package. As for qualitative analysis, data obtained from audiotapes were transcribed in Microsoft Word that had gone through deductive content analysis.

Results and Discussion

Sweet potato consumption and culinary processes: The white-fleshed sweet potato was the most processed and consumed (80.3%), then come beige-fleshed and OFSP (22.5%); and yellow-fleshed sweet potato (4.23%). Sweet potato is either taken as a whole or eaten with another food. Five (05) different sweet potato by-products were identified and these recipes went through three (03) main cooking methods: frying (83.1%), Boiling (22.54%) and toasting.

Behavioural determinants of OFSP consumption: Constructs of the model were set into two groups: internal factors and external factors (Figure1). In the ''Background and perception'' sub-group, just two constructs were significantly correlated with ''health behaviour attitude'': ''knowledge'' (rho =.522**, P <.001) and ''Perceived severity'' (rho =.264**, P <.001). Furthermore, 28.8% (Adjusted R^2) of the ''Health Behaviour identity'' variance was explained by the set of constructs of this sub-group and only ''Knowledge'' (β=.541; P<0.001) was a significant predictor. Our findings are consistent with those of the study conducted on primary school children in Kenya (Talsma *et al.,* 2013). The positive correlation between ''Knowledge'' and ''health behaviour attitude'' suggests that the more women are enlightened about OFSP nutritional benefits, the better their "Health behaviour identity". In behaviour change, a model called Stages of Change (Prochaska *et al*., 1994) is often used. According to this model, health behaviour change passes through a five-step process: pre-contemplation, contemplation, preparation, action, and maintenance. Respectively 22.9% and 21.3% of women agreed with OFSP ability to address VAD and its antiseptic features. This suggests that fewer respondents were aware of the VAD problem and knew that consuming OFSP can contribute to reducing VAD. Thus, we could assume

that there are some in the pre-contemplation and others in the contemplation stages. They will not deem it important to incorporate OFSP in their diet and hence move to the next stage of preparation (consisting of accepting and eating OFSP) unless they are taught about the positive effect of OFSP consumption.

Regarding the ''Belief and attitude'' sub-group, only ''Health behaviour Identity'' (rho =.216**, P <.001) and ''Attitude towards behaviour'' (rho =.218**, P <.001) were significantly correlated with the consumption of sweet potato. Their regression revealed that 93% (Adjusted R^2) of sweet potato consumption variance (including that of OFSP) is explained by ''Belief and Attitude'', only ''Perceived barriers'' (β=.-.146; P<0.005) and ''Attitude towards behaviour'' (β=.155; P<0.05) were significant predictors. Between ''Background and Perception'' and ''Belief and attitude'', ''Health behaviour identity ''acted perfectly as an intermediate variable. It was not a predictor of OFSP consumption but significantly correlated with ''Perceived barriers'' and ''Attitudes towards behaviour''. The sign of the correlations suggests that the more women are convinced of the benefits of OFSP consumption, the lesser barriers they perceived and the better attitudes they adopt.

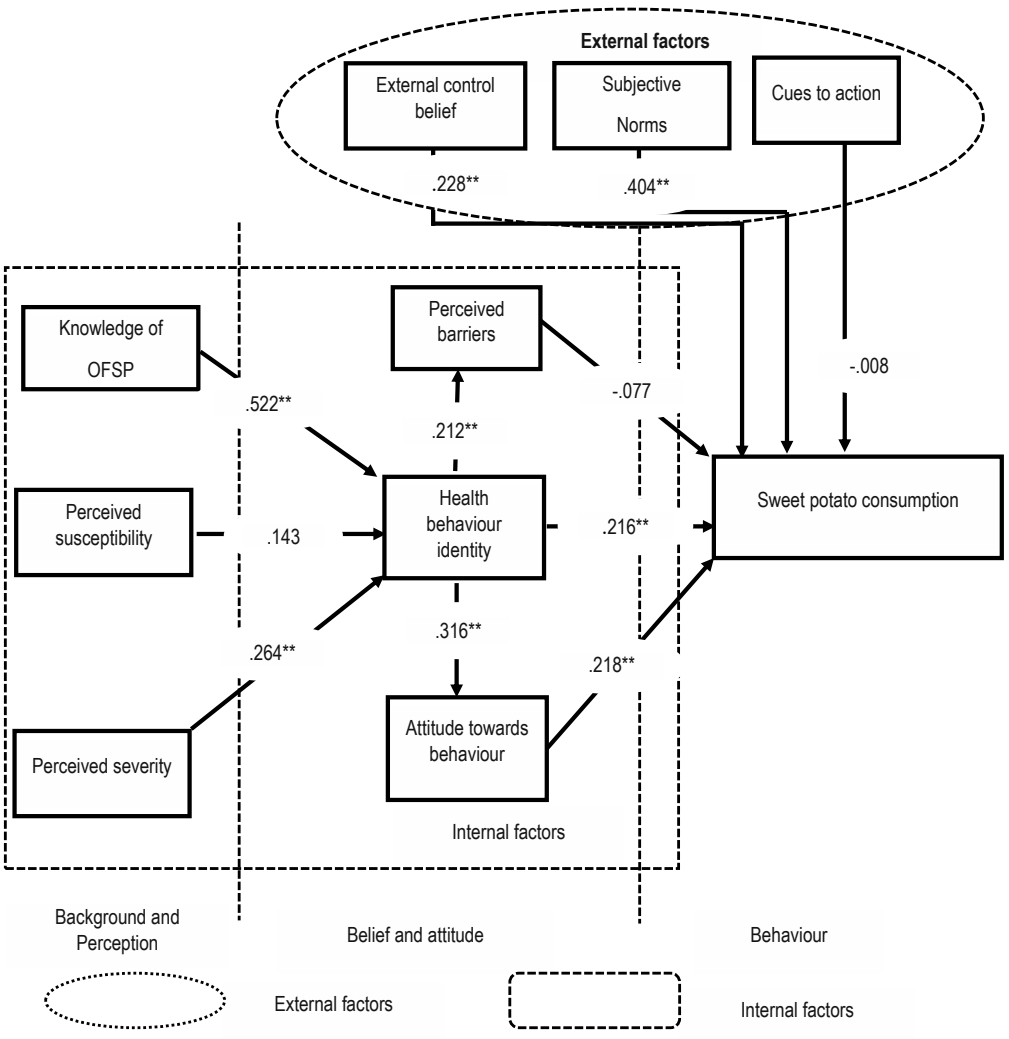

Figure 1. Combined health belief model and theory of planned behaviour with Spearman correlation coefficients between constructs

Among external factors, only ''External control belief" (rho = .228**, P <.001) and ''Subjective norms" (rho =. 404*, P <.05) constructs were significantly correlated with the consumption of sweet potato. As for internal factors, there were two sub-groups: ''Background and perception'' and ''Believe and attitude''. It was found that 15% (Adjusted R^2) of sweet potato consumption (including that of OFSP) variance is explained by ''External factors'' of which construct termed ''Subjective norms'' (β=.410, P<0.001) was the sole significant predictor. Our findings are slightly different from those of other studies (Fanou-Fogny *et al*., 2011; Abizari *et al*., 2013) because we did not integrate a construct termed ''Behavioural intention'' in our model. We rather searched for correlations among other constructs and OFSP consumption. In the community, the opinion of women's neighbours, husbands, family and caregivers were found to be important and thus, for an OFSP adoption strategy to be effective and to have a sustainable impact, one should not discard the above-mentioned influencers.

Socio-cultural factors affecting OFSP acceptance. History of introduction of OFSP: Little was known about OFSP introduction history in the community. In their opinion, OFSP is an exotic food crop introduced either by neighbours or foreigners or forefathers: *''my father has been producing it before my birth"*(FCG Adjohoun); *''Orange-fleshed sweet potato was introduced here 6-7 years ago… it was brought by traders from Kandi and Malanville"* (FCG Banikoara).

Trends in the acceptance of OFSP: OFSP production as well as its utilization have gone through two opposite trends from the north to the south: "…its production is very painful. It requires deep and fine ploughing and growing new varieties does not require much effort" (FCG Adjohoun); ''Orange-fleshed sweet potato is earning more appreciation among consumers '' (FCG Banikoara). This is at odds with those of a study conducted in Tanzania where farmers generally have a positive perception of OFSP production and consumption, especially its taste, yield, storability, disease resistance (among children) (Okello *et al.,* 2015).

Decision making in household towards sweet potato use. Opinion about sweet potato (OFSP including) consumption is divergent: ''More often, it is the father who decides what to eat even when it comes to eating sweet potato'' (FCG Atlantique); ''the decision to consume something is up to everyone in the household'' (FCG Adjohoun).

Disincentive aspect of sweet potato consumption in households. Participants' dislikes about OFSP consumption are related to its unsuitability to frying: *''Orange-fleshed sweet potato is not well adapted to frying because it retains more oil through that process than white-fleshed one."* (FCG Atlantique), the hardness of its tubers: *''the white variety cooks faster than the orange variety"* (FCG Adjohoun), its sugar content: *''its high sugar content is to its disadvantage here in terms of consumer preference."* (FCG Adjohoun). Our findings are different from those of Pillaly *et al.* (2018) who concluding that complementary food made from the OFSP was highly acceptable to infant caregivers because of its colour and soft texture (Pillay *et al.,* 2018).

Social beliefs associated with orange-fleshed sweet potato. Participants stated that there is no specific class or group of people to which OFSP is meant for: *''everyone eats sweet potato: rich, poor, adult and children"* (FCG Adjohoun). Sweet potato is qualified as ''food of pleasure" and should not be frequently eaten for fear of being regarded as pauper: ''Sweet potato should not be eaten for three days in a row. Otherwise, people will say that the consumer lacks money to diversify his/her diet and thus, s/he is a pauper'' (FCG Atlantique).

Cultural beliefs associated with OFSP. In <Aizo> ethnic group, in old days, sweet potato (including OFSP) was used for two events. It was used for twins children's naming ceremony: '' In <Aizo> culture, every time a woman gives birth to twins children, two statuettes are built to their name and should be maintained. The maintenance consists of always pouring red palm oil on top of the statuettes and bringing to their feet food commodities such as rice, maize, sweet potato so that the statuettes could look after the children as they grow up and always bless them.'' (FCG Atlantique). It is also used to invoke god < Dan> and gain his favour upon harvest: "Sweet potato is generally used for sacrifice purpose in <Dan> religion. This consists of piling up some sands, dropping harvested products (sweet potato in this case) on top of the sand pile and making some wishes. Once done, harvested products can now be put on sale'' (FCG Atlantique).

Up-scaling of the OFSP use. To promote OFSP consumption, there is a need to improve agronomics traits of OSFP (notably its yield) and its market so that its production could generate a lot of revenues to them: '*'we would recommend improving orange-fleshed sweet potato's yield and sugar content"* (FCG Adjohoun).

Conclusion

Factors that influence the acceptance of OFSP among women and children and identification of traditional processing methods were the main concern of the present work. Our finding concluded that OFSP consumption would not increase unless some beliefs-based factors are addressed. Health benefits of OFSP consumption require that its ability to address VAD as well as to contribute to improving the vitamin A status of consumers should be included in key messages during any nutritional intervention. There is therefore a need to address the flaws related to OFSP agronomic traits, the aptitude of OFSP towards frying and the market demand of OFSP. Also social organization and the way of sharing responsibilities of respondents are to be valued as important factors to ease OFSP acceptance. Once this is done, attention should be paid to the processing methods people use to process OFSP in order to preserve its nutritional value.

The results also indicated willingness of respondents to adopt OFSP afresh and include it in their diet to tackle VAD in their communities provided some bottlenecks are overcome. It will be worthwhile to conduct a similar study in a larger population so as to establish whether our findings can be extrapolated to a wider scale. Future research could also focus on how effective the mentioned predictors are on the rate of OFSP acceptance and consumption.

Acknowledgement

This research was funded by the Project "Sweet Potato: Improved Orange Fleshed Sweet Potato value chains for Food and Nutrition Security in Benin, Niger and Nigeria". This paper is a contribution to the Seventh Africa Higher Education Week and RUFORUM Triennial Conference held 6-10 December 2021 in Cotonou, Benin.

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