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Awareness, Attitude and Utilization of Orange-Fleshed Sweet Potato (OFSP): Critical Literature Review

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Abstract

The objectives of the study seek to review literature to establish the attitude, level of awareness and the extent of OFSP utilization. The study relied on secondary sources to synthesize and draw conclusions regarding the topic. The researcher reviewed a variety of documents and the data collected from previous published articles, journals, websites, original research papers and books to establish the awareness, attitude and utilization of OFSP. The review was supposed to offer important information regarding how widely used and known OFSP was. Evidence from the study showed that although most countries in the world were aware of OFSP's existence and nutritional advantages, the market for OFSP was not yet formally established. Most of the studies used emphasized that if OFSP is being processed into flour for making chips, biscuits, porridge, bread, drinks and other special forms of foods, consumers especially households would have accepted them to increase consumption. Socio-economic factors such as social class affect the level of utilization and preference patterns of the crop. Lack of storage facilities, lack of modern processing equipment and scarcity of OFSP vines had a great effect on its utilization. The study recommends that to increase agricultural value addition, OFSP farmers should be empowered through effective and efficient extension training on the usage of modern processing techniques. Also, OFSP should be processed into several foods for alternative income sourcing.

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Finally, it is recommended that future studies be conducted on consumers' willingness to pay for value-added products made from OFSP.

Keyword: Awareness, attitude, knowledge, utilization and orange-fleshed sweet potato

Introduction

Orange-Fleshed Sweet Potato (OFSP) - (*Ipomoea batatas* L Lam) is one of the many varieties of sweet potatoes. In most nations, OFSP is a crucial crop for ensuring food security and generating income. Among the several sweet potato types, OFSP is particularly high in beta-carotene, a great source of vitamin A (Van Jaarsveld, 2005).

Figure 1. Orange Fleshed Sweet Potato
Source: *Oloniyo et al.,* 2021

Consuming OFSP is a helpful option in underdeveloped nations where vitamin A deficiency (VAD), particularly in children, is a major problem (*Low et al., 2009*). Due to the acute lack of nutrient-rich food, severe malnutrition is a significant problem in many developing nations. Around 2.3 billion people in the world (29.3 percent) were moderately or severely food insecure in 2021 – 350 million more compared to before the outbreak of the COVID-19 pandemic. From FAO, IFAD, UNICEF, WFP, WHO report (2022), a total of about 924 million people, or 11.7% of the world's population, experienced acute food insecurity in the past two years, a rise of 207 million. With Sub-Saharan Africa and South Eastern and Western Asia experiencing the highest

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amounts. Due to its lack of micronutrients like vitamin A, Sub-Saharan Africa has a public health issue (*Worsley et al., 2015*).

Given the significance of nutrition for a nation's economic growth, efforts are made to guarantee that the food provided contains not only calories but also vital vitamins and minerals. National and international organizations have made significant and expanding efforts over the past few years to introduce OFSP as a biofortified staple crop and as a food-based strategy to alleviate micronutrient deficiency in Sub-Saharan Africa. This is because OFSP is identified as one of the most prominent bio-fortified food crops (*Masumba et al., 2007*). Biofortification, according to *Nestel et al. (2006)*, is a method for considerably increasing the content of micronutrients in staple food crops by the use of traditional breeding methods. The Orange-Fleshed Sweet Potato has been successfully developed and disseminated to communities in the northern regions of Ghana by the International Potato Center (CIP) and the Food Research Institute (FRI) of the Council for Scientific and Industrial Research (CSIR) of Ghana.

To boost knowledge of the new crop, mass communication channels have been used to disseminate information on the OFSP's nutritional and health advantages (i.e., regional stations linked with Farm Radio International). Although this radio campaign has raised awareness of the nutritional and health benefits of OFSP, the target audience (General public) has not been consuming OFSP in greater amounts for a variety of reasons. For one, including preference, superstition, and lack of access to the crop. Recent studies revealed ample information on OFSP is available (*Okello et al., 2015*; Mazuze, 2004; Ouro-Gbeleou, 2018). The crop despite its enormous benefits including its ability to help gain weight, boost immunity, ease digestion, treat bronchitis and stomach ulcers, it is less consumed by many sub-Saharan Africa countries. For instance, many interventions have been introduced by the World Health Organization (WHO) and other stakeholders in Mozambique and some Sub-Sahara African countries to help women to include OFSP which is very rich in vitamin A in their diets as a way of eradicating the health issues or risks among pregnant women and children under the age of five. Similarly, in the Northern Region of Ghana, fresh vegetables and fruits become relatively scarce and expensive because the planting season is unimodal with one rainy season in a calendar year which last for three months. In northern Ghana, we found that farmers cultivate OFSP as alternative food crop. Currently, the Department of Food Processing Technology in the University for Development Studies in Ghana, has studied the trend and consumption pattern of OFSP and started making some products from the orange-fleshed sweet potato in the region and its environs, but the pertinent question remains as to what extent are people aware of the orange-fleshed sweet potato. The questions asked include, “What has been the attitude and utilization pattern of

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the orange-fleshed sweet potato?" These are some of the questions the study intends to address. In light of these, the study attempts to ascertain the level of awareness, attitude and utilization of OFSP.

Summary of Physico-Chemical Properties of OFSP and its Flour

The physico-chemical properties of OFSP are presented in Table 1. The proximate composition is in agreement with the values reported by *Aina et al. (2009).*

Table 1. Physico-Chemical Properties of OFSP and its Flour

Component	Fresh Sample	Flour
Moisture content	69.4 to 73%	6.9 to 10. 97%
Ash	2.04%	2.11%
Protein	3.69%	4. 8%
Fat	0.42%	0.6%
Starch	65. 41%	33. 66%
Crude fibre	3. 68%	2. 57%
Carbohydrates	90. 17%	90. 13%
pH	6. 55%	6. 58%
Acidity (mL NaOH $100g^{-1}$)	1.08 mL NaOH $100g^{-1}$	0.91 mL NaOH $100g^{-1}$

Source: *Rodrigues et al.* (2016)

Fresh OFSP has a moisture content that varies from 69.4 to 735. Fresh OFSP has an ash value of 2.04 and flour has a 2.11% ash percentage. However, as compared to fresh OFSP, the protein level of the flour was as high as 4.8%. According to Bartova and Barta (2009), potatoes do not contain a lot of protein, but they do contain a type of protein with excellent nutritional and biological potential. The low-fat nature of OFSP is well-known (Aina et al., 2009). Flour makes up 0.6% of the sample, whereas fresh samples make up 0.42%. For fresh and flour samples, the starch level varied between 65.41 and 33.66%. This value surpasses the 23.9% reported by Andrade et al. (2012) for some fresh sweet potato varieties. On the other hand, *Abegunde et al. (2013)* reported values of starch ranging from 91.9 to 95.6% for eleven varieties of sweet potato.

Fresh flour has a mean crude fiber content of 3.68 %, while OFSP flour has a mean crude fiber content of 2.57%. This result is greater than the mean value of 2.40% for ten types of potatoes determined by Aziz et al. (2013). For fresh and OFSP flour, the average values of crude fiber are 3.68 and 2.57%, respectively. Additionally, the total carbohydrate content for fresh and OFSP flour is shown in Table 1 as 90.17 and 90.13% respectively. The fresh content showed a higher carbohydrate content, compared with the value 28.2% value reported TACO (2011) for sweet potatoes. According to *Roesler et al. (2008)* and Steed & Truong (2008), the pH values of fresh and OFSP flour range from 6.55 to 6.58%, indicating that processing has no impact on pH. However, the

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fresh and OFSP flour have an acidity concentration of 1.08 mL NaOH $100g^{-1}$ and 0.91 mL NaOH $100g^{-1}$, respectively. These values suggest that a little decrease in acidity was seen following processing, according to Rodrigues et al.'s (2016) observations. These values are in line with those reported by Roesler et al. (2008) for various cultivars of sweet potatoes, which ranged from 0.65 to 2.48mLNaOH.100G-1 in acidity content.

Theoretical framework

The study theoretical framework is based on the theory of Awareness, Knowledge Attitude and Practice (AKAP) framework. Globally, there is an increasing awareness of the need for new knowledge and when new knowledge is generated by research institutions, efforts must be made to disseminate this knowledge to beneficiaries. The success in achieving this will depend on whether the beneficiaries are aware of the existence of the knowledge, emphasizing the fact that, knowledge is not the starting point of the great variety of human ventures that can be brought to mind. Before one acquires knowledge, he or she must first be aware of the existence of the knowledge. A periodic, often argumentative, theme in the literature on diffusion of innovation, and more specifically on how best time has contributed to the spread of an innovation in these four (4) key variables referred to as Awareness, Knowledge, Attitude and Practice (AKAP). The AKAP approach is a framework for behaviour change (Schrader & Lawless, 2004). The AKAP framework was first developed in the 1950s as the first model to make a relevant impact in the extension innovation adoption process. It is convenient to think of extension as having its greatest economic impact by inducing innovation information through the following sequence:

A: Farmers' awareness of an innovation

K: Farmers' knowledge, through training, observation, experimenting and testing

A: Farmers' Attitude towards the innovation adoption

P: Changes in farmers' practices and behaviour

This sequence can be conceptualized as follows:

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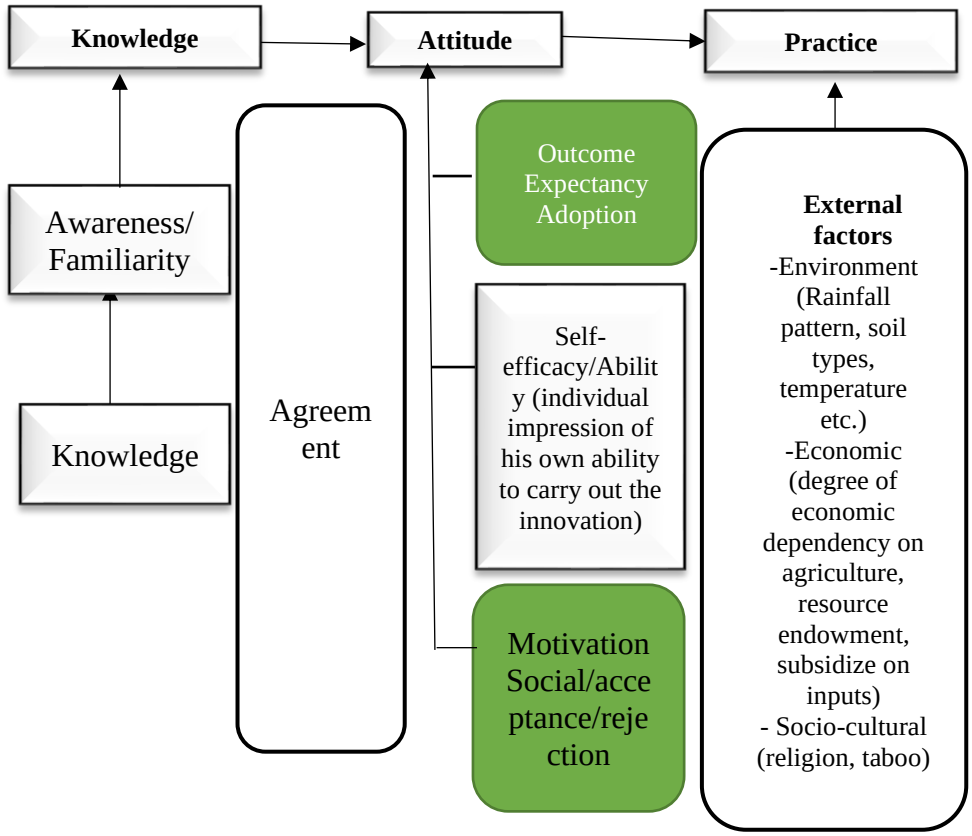

Figure 2. Conceptualization of the AKAP Framework
Source: Adopted from (*Kristen et al., 2006*)

The "AKAP framework" focuses attention not directly on the easier path to the knowledge-action space. But rather, the focus is on the (taken-for-granted) flow of effects that one should typically view or observe, empirically. With the AKAP framework, awareness is not knowledge. But knowledge necessitates awareness, observation, experience, and the critical capacity to assess facts using solid evidence. Knowledge leads to adoption, but adoption is not productivity. It can be inferred from Figure 2 where AKAP = Awareness (is only about the familiarization of OFSP), Knowledge alters or modifies Attitude, which alters or modifies Practice. In other words, Awareness is the starting point of knowledge, Knowledge modifies (predicts) attitudes, which modifies (predicts) the learner's practice pattern (behaviour). A person's intention to act in a certain way determines the behavior that person exhibits. His or her views about that behavior, which relate to what others believe he or she should do, their motivation to carry out those wishes, and their perception of behavior control, constitute the basis of the intention. If a person views a

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behavior as advantageous, they are more inclined to want to engage in that behavior and are more likely to do so (*Montano et al., 2002*). Nevertheless, behaviour intention does not always lead to actual behaviour, because some external factors come into play (Wheatley & Loechl, 2008). These external factors are categorized as environmental, economic, socio-cultural and policy signals. Conversely, a person's practice shows their attitude, and their attitude discloses their stock of knowledge or experiences, which depends on their level of awareness of the relevant information. Thus, this knowledge base can be deliberately exposed (subjected) to pre-selected "influencers," resulting in positive ripple effects on attitude clusters and later sets of behaviors. Extension, education, other change-agents, and media of all kinds are major "influencers" in this review. According to researchers, awareness, knowledge, attitude, and practice are connected, and awareness, knowledge, and attitude directly affect practice (*Mulume et al., 2017*).

The framework is useful for cross-examining the relationship between awareness, knowledge, attitude, and practice (utilization). It has an interesting scholastic pedigree, to say the least. This is due to the researcher's presumption that usage of OFSP is directly influenced by knowledge and attitude, which is related to awareness, knowledge, and utilization. Furthermore, it is worth noting that, the AKAP framework reveals the misconceptions that may create obstacles to the activities to be implemented and may become potential barriers to the utilization of OFSP. As a result, learning involves clear change, which typically shows through practice. From this point, it is also further worth noting that a fundamental characteristic of learning what is acquired is to measure and observe behaviour.

This behaviour is acquired through training in one or another kind. Surveys conducted using the AKAP framework have the potential to confirm or disapprove of a hypothesis, and identify what is known and done about specific themes (http://www.mediciusdumonde.org/outils/Nous-contacter). For this reason, the AKAP framework, in the researcher’s opinion, could be an interesting and one of the more appropriate frameworks to adopt in understanding and analyzing peoples’ awareness, attitude and utilization of Orange-Fleshed Sweet Potato. Coherent with the frame, the hypothesis is that the simple awareness, and attitude towards the existence of OFSP does not automatically lead to the utilization of OFSP which impedes the extent of use of OFSP by people in the northern region. This raises the possibility of links between each AKAP phase and usage. (Armstrong, 2016), emphasizes that people must be driven to learn and should be aware that their current attitude or behavior, level of knowledge, ability, or competency needs to be improved. The term "attitude" describes a person's particular approach to a certain circumstance. It has a knowledge-based foundation (based on experience) and produces specific behavioral patterns (Armstrong, 2016). (Gumucio, 2011),

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advances this by explaining that attitude is a way of taking a stand regarding an issue. These are the tendency to act in a specific way. Attitudes cannot be observed directly as in the case of practice (Gumucio, 2011). The AKAP model has been found relevant for the study because of its ability to measure the scope of an existing situation, disprove or confirm a theory, and offer fresh perspectives on the reality of a given circumstance.

Methodology

To conduct the study, the researcher used secondary data to synthesize and draw conclusions on the topic. Some of the information was collected from similar studies and others from primary sources (Cameron, 2018). In doing this, a variety of documents were reviewed, and the data were collected from articles, journals, websites, original research papers and books. The collected data were organized and compiled for interpretation. The google search led to the discovery of various online resources to establish the level of awareness, attitude and utilization of Orange-Fleshed Sweet Potato (OFSP). The literature reviewed undoubtedly renders distinct standpoints to the topic of the study due to the numerous types of research conducted on the OFSP.

Results and discusseions

Level of Awareness

Although most nations are aware of OFSP and its nutritional advantages, the market for this food supplement has not yet been organized and widely accepted by the general public, which could help increase access to it and its derivatives. To raise awareness and examine household attitudes toward OFSP, numerous interventions have been implemented in Kenya, South Africa, Tanzania, Ethiopia, Uganda, Ghana, and Mozambique. This is consistent with research conducted by Omoare (2019) and *Babatunde et al. (2019*), who found that the majority of farmers were aware of OFSP and had engaged in its production. A study conducted by *Adebisi et al. (2020)* found that 65% of respondents from Kwara State, Nigeria was aware of the health advantages of OFSP and that 89.3% of consumer respondents were generally willing to spend more than the bid price for OFSP. Furthermore, according to a study by *Osman et al. (2020)*, sweet potato farmers in the treatment communities of Kwara State were far more aware of OFSP genotypes than those in the control communities, which lacked research scientists and technicians (57.7% versus 19.2%). There is a need to encourage mass production of OFSP as a garden or backyard crop by making planting materials available to interested farmers. It is also evident from the review that most farmers are aware of the crop and its nutritional advantages. Additionally, those who were already familiar with OFSP had a higher likelihood of selecting OFSP bread (Ouro-Gbeleou, 2018).

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This then implies that if consumers are aware of the nutritional and health benefits of OFSP, they may easily adapt and explore innovative ways of processing it in different dietary packaging. This can help create alternative income-generating sources for women and the youth in particular and all unemployed people in the country at large.

Level of Utilization

A study conducted by *Babatunde et al. (2019)* in Kwara state in Nigeria indicated that almost 87% of the participants in the study were in support of the cultivation of OFSPs. Therefore, products from OFSP like bread and chips can be produced and sold to consumers at reasonable prices (*Awuni et al., 2017*). According to *Awuni et al. (2017)*, adapting meal recipes to include orange-fleshed sweet potatoes (OFSP) may increase dietary consumption of vitamin A. Subsequently, research undertaken in Tamale in the Northern region of Ghana revealed that consumers' expressed preference for orange fleshed sweet potato bread based on its sweet taste and soft texture. In the review of the various literature relating to awareness, attitude and utilization of orange-fleshed sweet potato (OFSP), most of the studies emphasized that OFSP is being processed into flour for making chips, biscuits, porridge, bread, drinks and other special forms of foods, consumers especially households would have accepted them to increase consumption. To explore consumer acceptance of and willingness to pay for OFSP in Uganda and Mozambique, respectively, *Chowdhury et al. (2011)* and Naico & Lusk (2010) employed data from choice trials. They found that when customers in Uganda are informed about the nutritional value of OFSP, they are prepared to pay considerable premiums. They discovered that consumers are prepared to pay just as much for OFSP as they are for conventional white sweet potatoes, even with the lack of nutritional information. They discovered that taste and socio-demographic characteristics are among the factors influencing willingness to pay. The pulp of the OFSP is valued by Mozambican customers more than the pulp of the conventional kind, according to (Naico & Lusk, 2010). Dry matter content and root size are two characteristics that customers value. They also found that, in contrast to rural areas, urban areas were more likely to accept and potentially consume OFSP when nutritional information was provided. In a similar case study, in Tamale in the Northern Region of Ghana, it was concluded that buyers were prepared to pay for the bread. made from OFSP for consumption which in effect will increase the level of utilization of the crop. Several research studies also indicate that knowledge of the crop also affects its level of utilization among households in both rural and urban areas. Socio-cultural factors such as social class affect the level of utilization or the consumption patterns of the crop and this is in line with the study conducted by World Health Organisation (2009) stated that sweet potato was still

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regarded as poor man food and neglected crop with little or no government support and is rated low in food priority listing because its processing and packaging are limited to traditional techniques. Lack of storage facilities, lack of modern processing equipment and scarcity of OFSP vines had a great effect on its utilization. Hence, the provision of storage facilities, modern processing equipment and provision of OFSP vines should be made available to farmers by the government.

Attitude towards Orange Fleshed Sweet Potato

Okello et al. (2015) in a study conducted the Lake Zone of Tanzania concluded that farmers had positive attitude toward the taste, yield, storage, disease resistance and popularity of OFSP. The study further established that farmers that participated in an OFSP project were more positive about its superior nutritional value and popularity among children. An investigation into consumer perceptions of Orange-Fleshed Sweet Potato (OFSP) puree bread in Kenya revealed that the level of education, gender and age both had an impact on consumers' attitudes toward OFSP (De-Groote et al., 2008). Other studies have revealed that understanding nutrition is favorably correlated with educational attainment, and consumers with higher educational attainments are more likely to seek superior products (*Worsley et al., 2015*). Studies further found that consumers' attitude toward the consumption of OFSP was influenced by the level of education, income level, flavor, texture and nutritional knowledge. Consumers have shown readiness to consume more of the crop as well as its products when it is made readily available throughout the year. Contrary to popular assumption, sweet potatoes are not simply food for women and children; farmers also include them as a significant portion of household diets. They utilize sweet potatoes to satisfy their hunger and regard the leaves as nutritious vegetables. Literature also revealed that children do not like OFSP due to its colour because they see the colour orange of OFSP to be rare so it prevents them from accepting it for consumption. *Hotz et al. (2012)* stated that the orange colour of OFSP is not a hindrance to its adoption and that building an 'orange brand' as part of a marketing campaign to promote vitamin A and OFSP can be very successful. can be very effective. For instance, the color orange can be utilized to convey important messages about OFSP and good health on market stalls, posters, t-shirts, hats, sarongs, etc.

Conclusion

Based on literature relating to the awareness, attitude and utilization of orange-fleshed sweet potato (OFSP), it can be concluded that most nations are aware of OFSP and its nutritional advantages. However, the market for OFSP has not been formalized and well recognized. Secondly, farmers had positive

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attitude toward the consumption and utilization of OFSP. Most of the studies emphasized that if OFSP is being processed into flour for making chips, biscuits, porridge, bread, drinks and other special forms of foods, consumers especially households would have accepted them to increase consumption.

Socio-cultural factors such as social class affects the level of utilization or the consumption patterns of the crop. However, the lack of storage facilities, lack of modern processing equipment and scarcity of OFSP vines had a great effect on its utilization. Therefore, the provision of storage facilities, modern processing equipment and provision of OFSP vines should be encouraged and made available to farmers by the government.

Recommendations

Based on the study, the following recommendations are made:

1. To process OFSP into several forms such as biscuit, breads, chips, drinks and other special forms of foods for alternative income sourcing.
2. Farmers of OFSP should be trained effectively and efficiently on the use of modern techniques for processing OFSP to help increase the crop's value.
3. To make Breads and other forms of foods from OFSP to make more affordable for consumers to be able to purchase.
4. It is also recommended for a study to be conducted on consumers' willingness to pay for value addition products derived from Orange Fleshed Sweet Potato.

Competing interest

According to the author, there were no conflicts of interest, either financial or otherwise.

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