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## KNOWLEDGE AND PERCEPTION OF STAKEHOLDERS ON THE UTILIZATION OF AFRICAN NUTMEG (*MONODORA MYRISTICA*) IN ACCRA, GHANA

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## ABSTRACT

The global consumption of spices has seen a significant rise due to their diverse benefits, including flavoring, preservation and medicinal properties. Ghana, with its rich biodiversity, stands to capitalize on this growing trend by enhancing the production, processing and utilization of its indigenous spices. Spices play a critical role in both culinary and medicinal practices worldwide, serving as a base for many foods and herbal formulations. They provide vital nutrients essential for human growth and maintenance, helping to address nutrient deficiencies. Moreover, spices are known for their preservative qualities, ability to mask the raw taste in foods like meat, and their appetite-stimulating effects. One such indigenous spice from Ghana is African nutmeg (*Monodora myristica*), a spice with several uses and health benefits. While significant research has been conducted on other spices such as ginger and chili peppers, there is a lack of detailed knowledge regarding African nutmeg in Ghana. This study sought to explore the marketing and consumption patterns of African nutmeg, shedding light on its utilization within the country. To gather data, a survey was conducted using structured questionnaires administered to 100 marketers and consumers through random sampling. The responses were then coded and analyzed using the Statistical Package for Social Sciences (SPSS), with the results subjected to descriptive statistics. Of the respondents, 96% were female traders from the Northern region of Ghana, where African nutmeg is widely traded. The spice is available throughout the year and enjoys strong demand from consumers. Despite its popularity, concerns about contamination and adulteration hinder marketers from purchasing or selling African nutmeg in its powdered form. This presents a challenge to the spice's full utilization in the market. Given these findings, it is crucial to conduct further research into the best production, treatment, and processing methods for African nutmeg. Such research could help improve the quality of powdered African nutmeg while preserving its nutritional composition and ensuring that it remains safe for consumption. By addressing these issues, Ghana could strengthen its position in the global spice market, increase the economic potential of African nutmeg, and contribute to the overall growth of its spice industry.

**Key words:** African nutmeg, Consumers, Perception, Marketing, Processing and Utilization



## INTRODUCTION

Spices are dried parts of plants (seeds, fruits, leaves and barks) that serve as flavorings, condiments and even medicine [1, 2]. They are essential components of human nutrition and provide humans with minerals, vitamins and other nutrients [3, 4]. Spices have been known from time immemorial as the base for most foods and herbal medicine formulations [5, 6]. They are also known to have preservative properties, mask the taste of rawness in foods like raw meat, and serve as appetite stimulants [4,5, 7].

There are several varieties of spices across the world. In Ghana, some of the spices used include: the West African black pepper, West African locust bean, Ethiopian pepper, grains of paradise, thyme, cloves, paprika/chilli, onions, garlic, ginger, sorghum leaves, *Tetrapleura tetraptera* (prekese), *Myristica fragrans* (foreign nutmeg) and *Monodora myristica* (African nutmeg) [7]. The African nutmeg has gained little recognition among these spices, though it has numerous benefits [8].

The African nutmeg is known by the people of Ghana as 'wediaba' (Twi), 'mlai' (Ga), 'ayikui' (Ewe) and 'elmiya.' The African nutmeg is a plant native to West Africa [7,9]. The seed (the most economically important part of the plant) of the African Nutmeg is mostly used as a condiment to prepare stew, soup, steam fish/meat, when ground into powder [10]. It has a flavor similar to the imported foreign nutmeg and has the potential to replace the usage of foreign nutmeg [11]. The African nutmeg has numerous seeds embedded in the fruits hence making it less expensive than the foreign nutmeg [12]. The African nutmeg is also used as an antioxidant, anti-depressant and stomach disorders reliever [12,13].

Globally, the consumption of spices increased to about 12,269 kilo tonnes (kt) in 2020 due to the increased demand for naturally organic flavoured meals for a healthy life [14]. The global spice market is estimated to be about \$22.8 billion by 2026 and India is known to be the world's biggest producer and exporter of spice [14]. The increase in the demand and consumption of spice has made spices an avenue for foreign earnings [15]. However, in Ghana, most of the African spices have been replaced with foreign spices [16]. Ghana could take advantage of the trend of spices in creating revenues by paying attention to the production, processing and promoting the utilization of her indigenous spices.

In Ghana, several studies have been conducted on the marketing, consumption and utilization of spices such as ginger, chilies, thyme, fennel and grains of paradise [5, 7, 16, 17]. However, limited to no data has been documented on the marketing, consumption and utilization of the African nutmeg. This study, therefore,

aimed at surveying the marketing and consumption of African nutmeg in Ghana to ascertain its utilization pattern.

## MATERIALS AND METHODS

### Study Area

The study was carried out in three (3) market centres namely: Makola/Agbogbloshie, Nima, and Madina market, all in the Greater Accra Region of Ghana. The Greater Accra region was selected because it is the capital city of Ghana and has the largest population. The chosen markets are major and most popular in the region where most people come to do their wholesale and retail selling and buying. They are also known for selling raw and processed foodstuffs [18].

### Data Collection and Sampling Technique

The survey was carried out using structured questionnaires. Using a random sampling technique, 100 marketers and consumers were interviewed. Respondents were aided with answering the questions by translating the questions into the local languages (Twi and Ga) for better understanding. All 100 questionnaires were retrieved, implying a 100% response rate. The questionnaires were structured into two components. The first component represented the respondents' socio-demographic background, including gender, age, ethnicity and educational level. The second aspect included information on the marketing and consumption of the African nutmeg.

### Data Analysis

The responses were coded and then analysed using Statistical Package for Social Sciences (SPSS version 26, Chicago-USA) and subjected to descriptive statistics. Results were presented in Tables, pie charts and bar charts.

## RESULTS AND DISCUSSION

### Socio-demographic characteristics of respondents

Findings from the socio-demographic characteristics of the respondents (Table 1) showed that the majority (96 %) of the respondents were females. The age groups were evenly distributed, with the majority (31 %) being within the age range of 30 - 39 years and the minority (8 %) being less than 20 years. Most of the respondents were Northerners (46 %) from the Northern sector of Ghana with Akans (middle sector) and Ga/Ga-Adangbes (southern sector) being of equal representation (16 %). It was also observed that most respondents had some level of education, with the highest level of education attained being secondary/technical education (32 %).

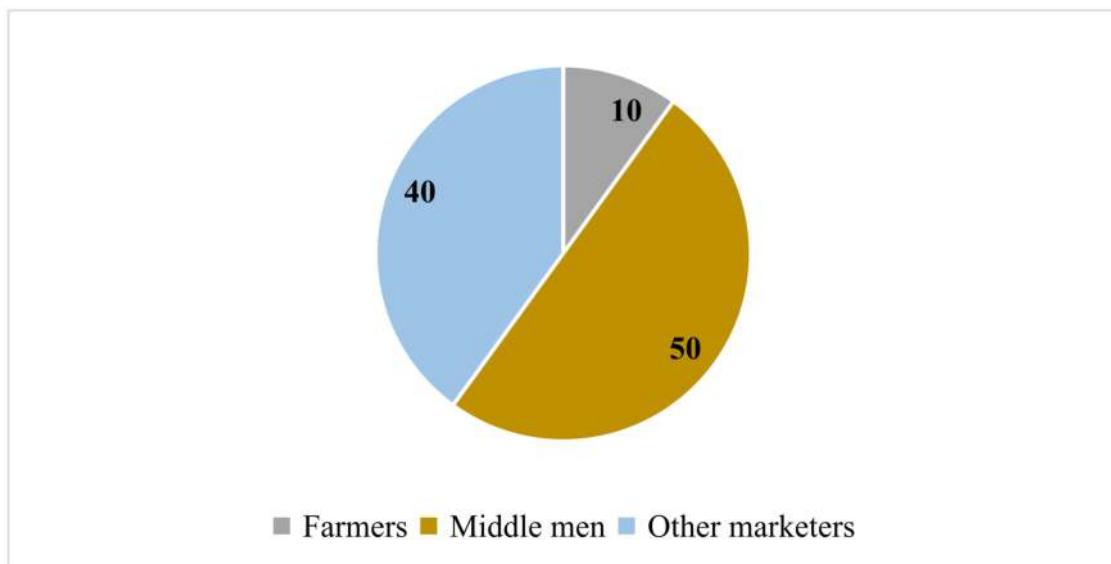


The high number of female respondents (96%), could be attributed to the fact that selling, buying and cooking food is traditionally the responsibility of females [19]. A study by Storz *et al.* [20] and Flagg *et al.* [21] reported women to be responsible for trading, shopping and cooking. This observation is similar to a finding by Antwi and Matsui [22]. Although almost all age groups were involved in the selling and buying of African Nutmeg, the economically active age group (30 -39) was the most involved because the youth are believed to be very vibrant and active at this stage of their life. Northerners are known to be the major producers and consumers of local spices in Ghana. They mostly use spices in preparing all of their delicacies [23]. With regards to education, the highest level attained by most of the respondents is indicative of the fact that all the respondents understood and had knowledge of the selling, buying and consumption of African Nutmeg. Mityko [24], reported that education plays a role in consumers' knowledge and perception of a product. This suggests that the respondents understand the importance of new and improved techniques or measures for the production, preservation, marketing and consumption of African Nutmeg when educated.

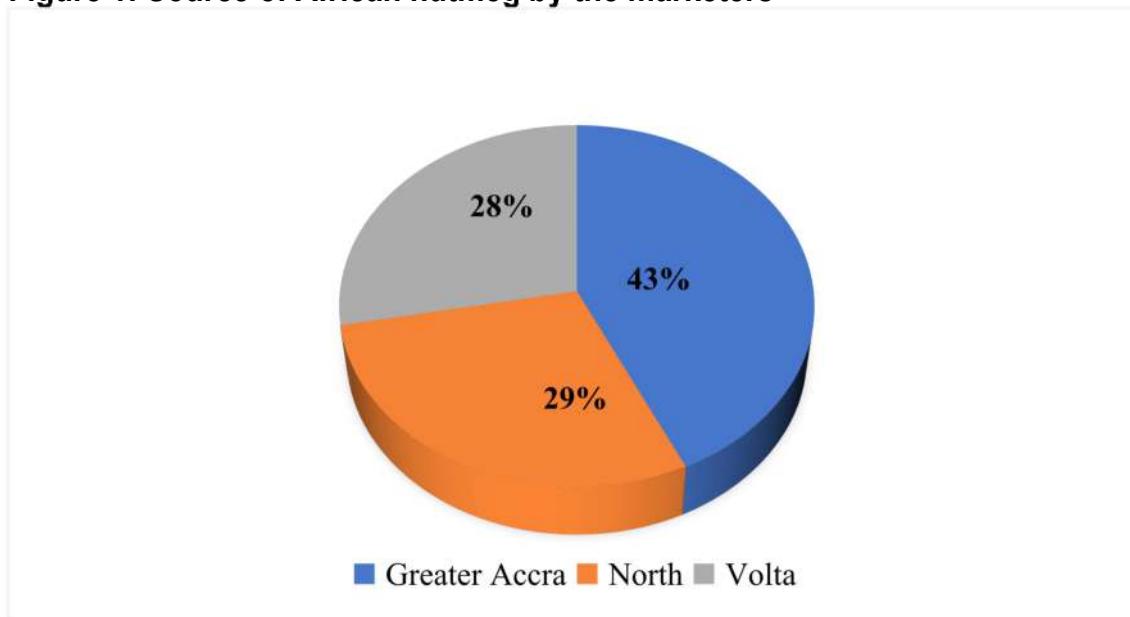
### Marketing and consumption of the African nutmeg

Results obtained from marketers on the number of years they have been selling the spices are shown in Table 2. Most of the marketers had been selling the African nutmeg (*Monodora myristica*) for between 1 to 10 years (52 %), followed by 11 – 20 years (26 %), and then those who had been selling for over 20 years counted for 20 % of the respondents. Most of the marketers (50 %) obtained the African Nutmeg from middlemen who brought the spice from the villages (Figure 1). About 10 % got the spice directly from the farmers themselves, while 40 % bought from other marketers in the market. Figure 2 shows the regions in Ghana where the marketers obtained the African nutmeg. From the responses, 43% of the African Nutmeg were obtained from the Greater Accra Region, 29 % from Northern and 28 % from the Volta region.





**Figure 1: Source of African nutmeg by the marketers**



**Figure 2: Regions in Ghana where African nutmeg were obtained by marketers**

From the findings, very few of the respondents (2 %) sold African Nutmeg for less than a year, meaning most of the respondents had adequate knowledge and had more experience in the marketing of African Nutmeg. The findings also show how long the respondents had been selling and consuming the African Nutmeg. Although farmers are known as the producers in the food chain, middlemen are the ones who get the food products to marketers or consumers. Thus, they act as intermediaries between farmers, marketers, or consumers [25]. This is because the delivery of food products from farmers to consumers involves a lot of functions, which makes it capital-intensive, tiresome, and also time-consuming [26]. Thus,

marketers cannot leave their selling business to go to farmers to buy and farmers may not have much time to go about distributing the food products to the marketers [25]. Hence, these middlemen bridge the gap of these uncertainties by buying directly from the farmers and selling the food products to the marketers or consumers [27]. This could have contributed to the result (greater percentage of respondents purchasing from middlemen) obtained in this study. Oguma *et al.* [25] reported a similar finding, where about 81.1 % of the respondents stated that middlemen were the conveyors of the produce from farmers to them as reported in a survey on the implications of middlemen in the supply chain of agricultural products. The authors attributed it to the fact that middlemen are the bulk buyers and assemblers of raw produce and convert them into marketable forms. In this study, the respondents who bought from the marketers stated that they did so because they did not buy much quantity to sell, and others also bought for their consumption. In Figure 2, the Greater Accra Region was seen to be the greatest producer of the African nutmeg possibly because the respondents purchased mainly from middlemen and other marketers instead of directly from farmers. However, most respondents, including two farmers and one middle person (female) stated that the plant was mostly grown in the Northern and Volta Regions of Ghana.

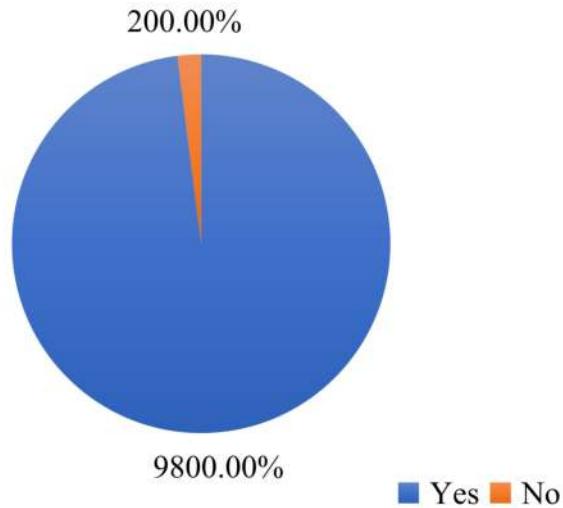
Responses to the patronage of the African nutmeg are represented in Table 3. The majority (95 %) of the respondents stated yes to purchasing the nutmeg while the remaining stated no or sometimes to the question. A follow-up question was asked on the reasons for their responses to the purchase of the African nutmeg. Out of the 95 % who responded yes to purchasing, 55.4 % used the African nutmeg as food, and 34.8 % used it as medicine (Table 3).

The high patronage of the African nutmeg (Table 3) could be as a result of the role the spice plays in food preparation. This was confirmed by the respondents in Table 3. They associated the reasons people purchase the African nutmeg to food preparation and for medicinal purposes. Onyenibe *et al.* [28] and Burubai *et al.* [29] reported that the African nutmeg is used as food, medicine and alcohol. However, 5 % of the respondents reported that people do not purchase the African nutmeg. They attributed this to people having little knowledge of the African nutmeg, hence their preference for using the foreign nutmeg (*Myristica fragrans*). Knowledge and perception of a product influences its consumption [30]. About 3 % stated that the buying of the African nutmeg fluctuates, attributing it to economic hardships (Table 3). They added that people purchased based on the availability of income and also the price of the African nutmeg spice.

Figure 3 represents the availability of the African nutmeg. It was observed that the African nutmeg was always available (98 %) and consumed by most of the respondents (96 %). Only 4 % of the respondents stated they did not consume the



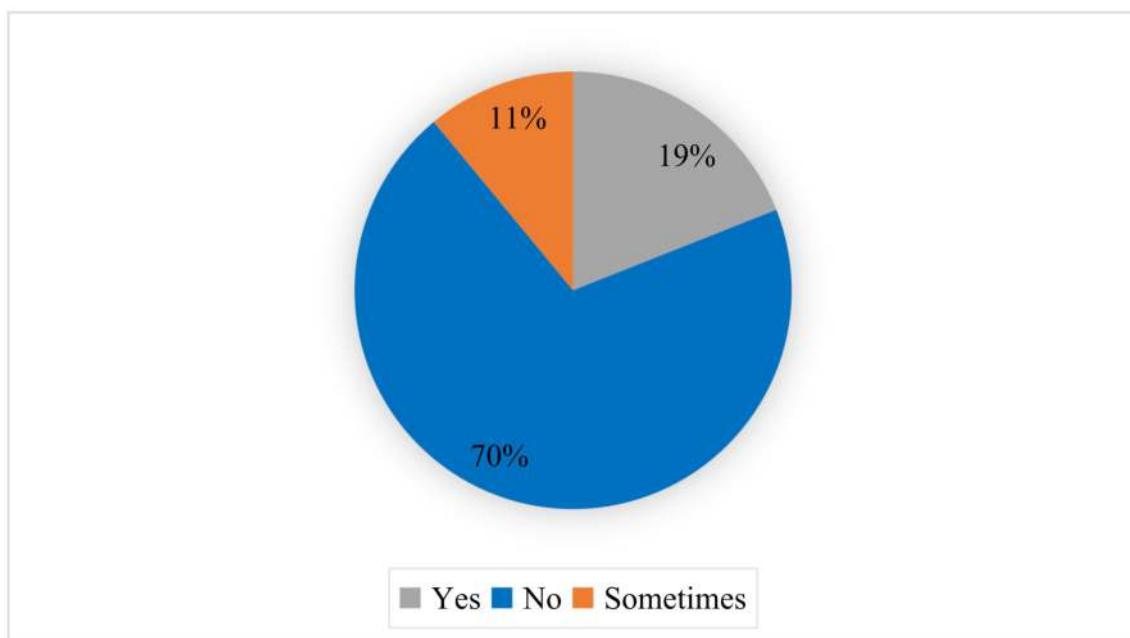
spice (Table 4). Table 4 indicates the reasons given by the 96 % who consumed the African nutmeg. About 72.90 % consumed the spice because of the aroma and flavour it provides and 27.10 % consumed it because of the medicinal benefits it provides.



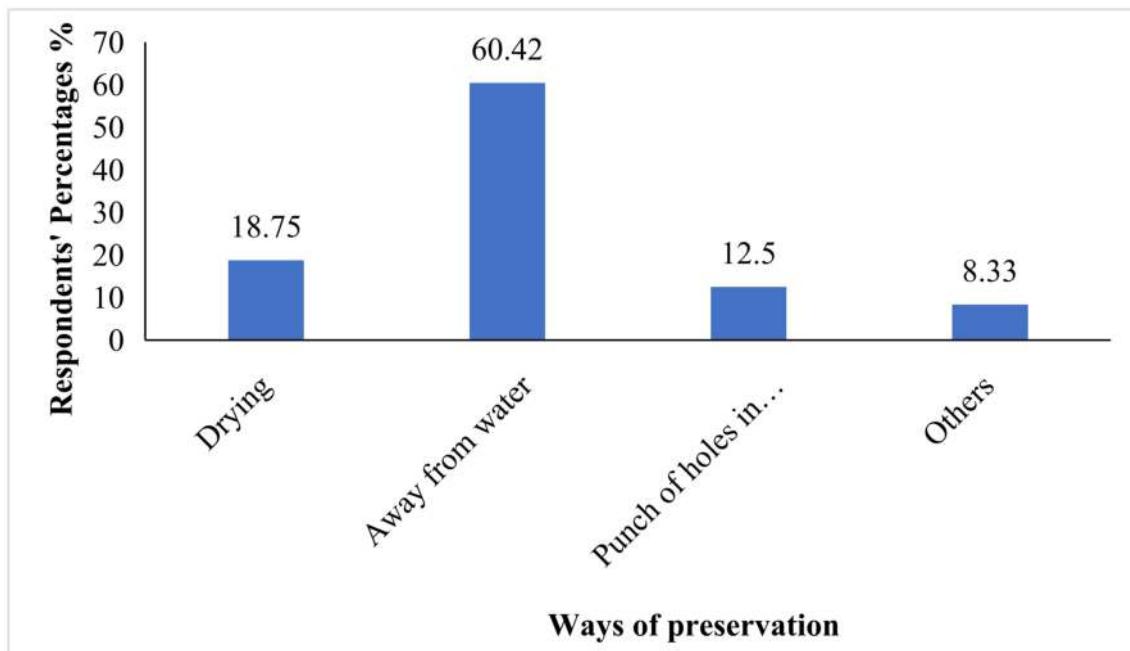
**Figure 3: Availability of African nutmeg**

The availability of African nutmeg throughout the year could be attributed to the numerous seeds (yield) the fruits of the plant produce [12]. The high consumption of the African Nutmeg (96 %) could be due to the benefits the African Nutmeg provides. The African nutmeg adds flavor and aroma to food, it is rich in nutrients and has medicinal properties [5, 28]. This has been confirmed in the present study (Table 4). However, 4 % of the respondents did not consume the African nutmeg. This, they stated, could be attributed to the intense aroma and also because others lacked or had little knowledge of the African nutmeg (Table 4).

Table 5, and Figures 4 and 5 show the responses to the storage, storage conditions and preservation of the African nutmeg. About 96 % of the respondents stored the spices. Out of the respondents who stored the spices, 41.66 % stored the African nutmeg in polythene bags, 40.63 % stored them in sacks and the remaining 17.71% stored them in bowls (Table 5). The majority of respondents (70 %) reported that the African nutmeg does not go bad. They were further asked how they preserved the African nutmeg from going bad. About 60 % of the respondents reported keeping the spice away from water, 18.75 % said they either sun or air dried, 12.5 % stated that they punched holes in the polythene to allow aeration while the remaining 8.33 % gave other reasons like frequent change of polythene bags and buying of quantities that can sell fast (Figure 5).



**Figure 4: Response to possible spoilage of the African nutmeg**



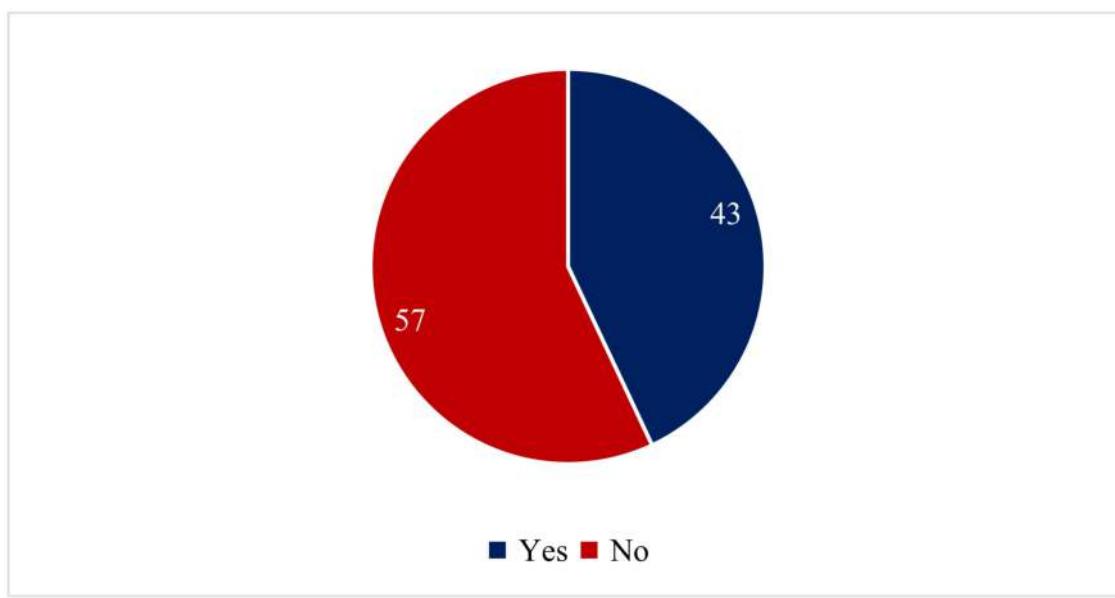
**Figure 5: How respondents preserve the African nutmeg**

Mitra reported that nutmegs and mace are stored in double linen woven or jute bags to prevent sweating and mould development [31]. The author reported that special care must be given to such spices if they are stored in other packaging materials to avoid spoilage.

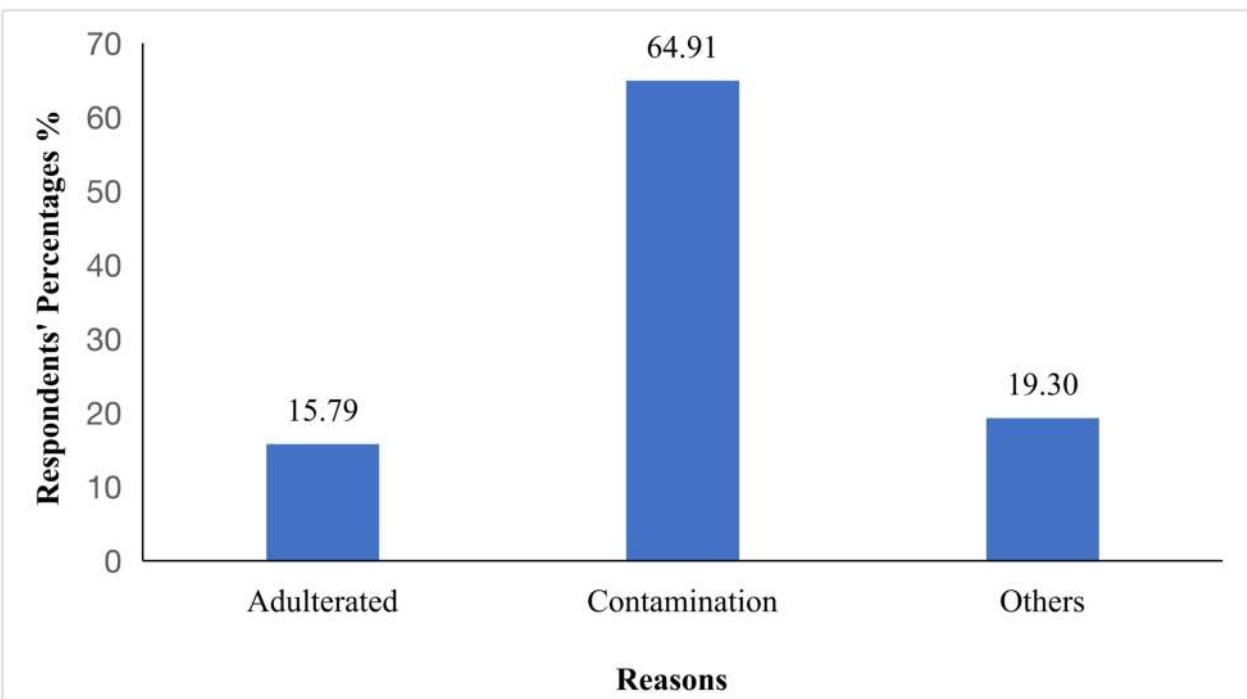
The long shelf life of the African nutmeg reported by the majority (70 %) of the respondents could be attributed to the low moisture content of the African nutmeg

[5]. However, the remaining respondents (30 %) stated that the African nutmeg does go bad. This could be due to mishandling or the spice coming into contact with water, spoilage microorganisms, and insects among others. Spices in general are known to have low moisture content but can go bad when in contact with water, insects, or contamination during production processes and storage [32, 33]. Sun and air drying are known to be traditional methods of food preservation [34]. This could account for the reason why the respondents dry the African nutmeg to preserve it. Also, water, damp and moist environments are the precursors of food spoilage and provide microorganisms with the right atmosphere to survive [35], hence one must avoid contact with dried food products. This could be the reason respondents kept the nuts away from water and allowed for aeration in polythene bags.

The responses of respondents when asked to name a spice that could be compared or substituted with African nutmeg are shown in Table 6. About 52 % of the respondents (majority) compared or substituted the African nutmeg spice with foreign nutmeg (*Myristica fragrans*) and 8 % compared the spice to cloves (*Syzygium aromaticum*). The remaining 40 % of the respondents, however, responded that no spice can substitute or be compared to the African nutmeg. Their reasons for their responses (Table 6) were that the substitute spices are medicinal, have a similar purpose and have aroma and flavour just like the African nutmeg (Table 6). Spices are reported to play the role of adding flavour and aroma to food while some are known to be medicinal [1, 6]. However, every spice is unique in its way. Also, African nutmeg is known to have a flavour similar to that of the foreign nutmeg [11].



**Figure 6: Respondents' willingness to sell/buy powdered African nutmeg**



**Figure 6a: Respondents' reasons for not willing to sell/buy powdered African Nutmeg**

Figure 6 shows a fair distribution of respondents' willingness to buy/sell the African nutmeg in powdered form. The majority of the respondents (57 %) were not willing to buy/sell the African Nutmeg in its powdered form. The majority (64.91 %) attributed it to the fact that it could easily be contaminated (Figure 6a) during processing or selling (exposure) but also stated as additional comments that if it was well packaged and treated, they could purchase or sell. Contamination of spices is reported to result from production processes hence respondents' reasons for not purchasing the powdered form of African nutmeg. However, preservation methods such as packaging and irradiation can improve the quality of food [32, 33]. About 19.30 % represent the other reasons such as buyers' preference to buy the African Nutmeg in the raw state (nut/seed). This is because some used it as medicine while others say the pungency of the powder diminishes with time and also may spoil early due to the contamination. The 43 % of respondents willing to sell/buy the African Nutmeg in a powdered form stated that it made work easier for them. That is, they did not have to grind or mill it before using it. The marketers said some consumers preferred the powdered ones. Food consumption is influenced by the preference or choice of the consumer [36].

## CONCLUSION AND RECOMMENDATIONS FOR DEVELOPMENT

The African nutmeg was available all year round, with young females forming the majority of the people (96%) who marketed and consumed the spice. Most people

(96%) knew the use and benefits of the African nutmeg and hence consumed it. However, most people (57%) were not willing to sell or buy African nutmeg in its powdered form due to the possibility of contamination and adulteration during processing and selling. The powdered form of the African nutmeg could be highly patronised if treated and processed under good manufacturing practices. It is, therefore, recommended that more studies should be conducted on the powdered African nutmeg and how it can be improved to increase its purchase.



**Table 1: Socio-demographic characteristics of respondents**

Variable	Percentage (%)
<b>Gender</b>	
Male	4.0
Female	96.0
<b>Age</b>	
Less than 20 years	8.0
20 – 29 years	12.0
30 – 39 years	31.0
40 – 49 years	20.0
50 – 59 years	18.0
Above 60 years	11.0
<b>Ethnic group</b>	
Akan	16.0
Ga/Ga-Adangbe	16.0
Ewe	22.0
Northern	46.0
<b>Level of education</b>	
No formal education	21.0
Basic	29.0
Secondary/Technical	32.0
Tertiary	18.0

Source: Data obtained by the survey team of researchers

**Table 2: Respondents years of selling African nutmeg**

Years of Selling African Nutmeg (Years)	Respondents' Percentage (%)
< 1	2
1 – 10	52
11 - 20	26
> 20	20

Source: Data obtained by the survey team of researchers

**Table 3: Purchase of African Nutmeg**

Variable	Percentage (%)
<b>Frequency of purchasing of African Nutmeg</b>	
Yes	95
Sometimes	3
No	2
<b>Reasons for Purchasing</b>	
Food	55.4
Medicine	34.8
Others	9.8
<b>Reasons for not Purchasing</b>	
Economic hardship	37.5
Little Knowledge	25
Prefer Foreign Nutmeg	37.5

Source: Data obtained by the survey team of researchers

**Table 4: Consumption of African Nutmeg**

Variable	Percentage (%)
<b>Consumption of African Nutmeg</b>	
Yes	96
No	4
<b>Reasons for Consumption</b>	
Aroma and flavour	72.9
Medicine	27.1
<b>Reasons for not Consuming</b>	
Little knowledge	50
Strong aroma	50

**Table 5: African Nutmeg Storage**

Variable	Percentage (%)
<b>Storing of African Nutmeg</b>	
Yes	96
No	4
<b>Medium of Storage</b>	
Bowl	17.71
Sack	40.63
Polythene bag	41.66

Source: Data obtained by the survey team of researchers

**Table 6: Comparison of African Nutmeg to Other Spices**

Variable	Percentage (%)
<b>Comparative Spice</b>	
Foreign nutmeg ( <i>Myristica fragrans</i> )	52
Cloves ( <i>Syzygium aromaticum</i> )	8
None	40
<b>Comparative Reasons</b>	
Aroma and flavour	50
Purpose	2
Medicinal	8
Unique	40

Source: Data obtained by the survey team of researchers



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