



Consumer Knowledge, Perception and Acceptability of Fresh Cut-Fruits and Irradiated Fruits in Ghana

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ABSTRACT

Fruits are important elements of a healthy, balanced diet, be it as part of a main meal or as a snack. The quest for ready-to-eat fruits has resulted in cut-fruits such as pawpaw, watermelon and pineapple in the Ghanaian fruit market. However, the safety and quality of these products cannot be guaranteed due to the mode of preparation and packaging. These products have longer shelf life when properly preserved and, therefore, assure all year round availability of fruits in different forms. The objective of this study was to assess consumer knowledge, perception and acceptance of fresh-cut fruits and irradiated fruits in Ghana. This was a cross-sectional study involving respondents in Accra (a cosmopolitan city). Information was collected by an open-ended questionnaires administration. The responses were coded and analyzed using SPSS Statistical Software Version 16. The results revealed that consumption of fruits and cut-fruits in Greater Accra is relatively high. It showed that 94.5 % of the respondents like fruits of all kinds. Mango was the most preferred (40.5 %) and 79 % of respondents preferred the seedling (local) mango to the grafted (exotic) variety. More tertiary educated people (48 %) consume fruits than others. More people (69 %) always buy cut-fruits and more males (63.5 %) patronize cut-fruits than females. People between the ages of 21 – 30 years patronize more cut-fruits and only 52 % of the respondents have heard about irradiated fruits, however, only 47 % would buy irradiated fruits because they are hygienic and safe. Others associated irradiation with radioactivity. The knowledge of fruits irradiation is very low in Ghana however; the consumption of fresh cut- fruits is high.

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Introduction

The populations in many countries have evolved busy lifestyles that are increasing daily. This busy lifestyle has led to the demand for ready-to-eat foods including fresh-cut fruits that should be safe, shelf-stable, and convenient. Convenience foods are commercially prepared foods that require little or no preparation before consumption and are sold as room temperature, refrigerated or frozen products that satisfy the needs of the consumer [1].

Fresh-cut fruit is defined as “fresh” and “minimally-processed” fruit products that have been freshly cut, washed, packaged and maintained with refrigeration to offer consumers high nutrition, convenience and flavour while still maintaining freshness[1]. There are however, difficulties encountered with fresh-cut fruits. Such difficulties include tissue softening, tissue browning (due to enzyme activities and fermentation in the cut-tissues), and bacterial, and yeast and mould contamination, loss of flavour and colour [2], and consumer acceptability becomes marred by these loss of flavor and loss of colour. Currently the production methods of cut-fruits, and the complexity of food handling and processing provide many opportunities for contamination as well as survival and growth of pathogenic organisms [3]. Numerous cases of *Salmonella* infections and including *Escherichia coli* 0157:7H outbreak caused by consuming different fresh products have been reported [4].

Over the years, scientists have been finding ways of preserving food and protecting it against microbial contamination and spoilage. Techniques include drying, heating, fermenting, use of preservatives (other than salt), canning, freezing and refrigeration [5]. Nevertheless, none of these was able to eliminate pathogens in the foods. It is also unlikely that the methods of production currently used can ensure total freedom from contamination, for many spoilage bacteria and pathogens are part of the normal vegetation of the environment such as the washing water, workers’ hand and body, wrappers and the carriages. These microorganisms however can be eliminated or reduced in number by the use of irradiation [6, 7] Food irradiation had been proven promising food safety technology that can reduce pathogens in foods and prevent food poisoning [5]. Irradiation dose between 1.5 kGy to 2.5 kGy is able to eliminate all viable cells in fresh cut-mango fruits after 9 days of storage at 6 °C [6]. Food irradiation is an effective and widely applicable food processing method when carried out under conditions of Good Manufacturing Practice (GMP). It can serve as a complement to GMP and quality control and as part of an overall food safety and protection system. Food irradiation uses ionizing energy and levels of absorbed radiation are measured in kilograys (kGy). It is safe, can control food spoilage and can extend the shelf life of foods with minimal effect on nutritional or sensory quality [8,9,10]. Although not yet widely

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used, irradiation can kill the bacteria responsible for food borne illness and food spoilage, as well as insects and parasites that may be present on food [11]. Additionally, in certain fruits and vegetables irradiation can inhibit sprouting and delay ripening [8, 9, 10].

The effects of irradiation on food, animals and the people consuming irradiated foods have been studied extensively for more than 50 years. Irradiated fruits, potatoes and spices have been available for more than 20 years [12] and that had been eaten by the Apollo astronauts on the moon and on the joint American-Soviet Apollo-Soyuz space flights [13] When irradiation is done in accordance with laid down procedures approved for food, it maintains the integrity of the food and its nutritional value. Food irradiation does not make food radioactive or introduce dangerous substances into food or compromise nutritional quality, or noticeably change the taste, texture, or appearance of food [14]. In fact, any changes made by irradiation are so minimal that it is not easy to tell if a food has been irradiated.

Presently more than 50 countries have given approval for over 60 products for irradiation. The USA, South Africa, The Netherlands, Thailand and France are among the leaders in adopting the technology [15]. Ghana has not fully accepted food irradiation due to limited information and education on the safety of food irradiation.

Work done by the International Consultative Group on Food Irradiation (ICGFI) has shown that when there is less knowledge, people for fear of the unknown, may not want to buy irradiated foods. On the other hand, where there is knowledge more people are prepared to buy. Again if the survey is been done without the food, less people buy; but evidence have shown that when the benefits of irradiation are apparent in the food, more people prefer irradiated food to non -irradiated foods [16].

There is a fast growing market for fresh-cut fruits in Ghana and this can be a potential source of food-borne diseases due to the method of preparation. Even though Ghana has not fully accepted food irradiation, a better knowledge of irradiation and of cut-fruit consumer preferences would provide the basis for improvement of the quality and safety of cut-fruit in Ghana. The study aimed at assessing consumer knowledge, perception and acceptance of fresh-cut fruits, food irradiation and irradiated fruits in Ghana.

Methodology

Study respondents

This was a cross-sectional study involving respondents in four locations, which represent a cosmopolitan population in Accra. In the framework of an emerging market of cut-fruits and irradiated fruits in Ghana, representative samples of 200 consumers including students, traders and staff of establishments (Table 1) were randomly interviewed from Adenta, Legon/University of Professional Studies Accra, Madina and Accra Central (High Street).

Table 1. Location of study participants

Area	Location
Adenta	Homes/streets
Madina	Markets/streets
Legon	University of Ghana/UPSA campuses
Accra Central	High Street/Banks/High Court

Data Collection

Information was collected by administering semi-structured questionnaires. Questions asked include “kind of fruits prefer; preference for seedling (local) or exotic (grafted) mango, gender, age, marital status, household size, patronage of cut-

fruits, knowledge of irradiated fruits and patronage of irradiated fruits/foods”. Preferences for cut-fruits and irradiated foods were evaluated. The responses were coded and analyzed using SPSS Statistical Software Version 16. The results were presented in tabular and graphical forms.

Results and Discussions

Two hundred (200) people responded to the questionnaire. This number includes 63.5% (127) males and 36.5% (73) females

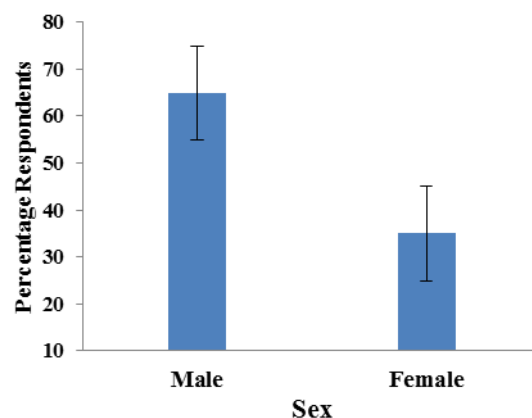


Figure 1.0. Percentage gender distribution of respondents who like fruits (values are percentages with percentage error bars)

Results showed that more males, 63.5% (127) patronise fresh cut-fruits than females 36.5% (73) Fig.1.0 In Europe it was found out that girls and women consume larger amounts of fruits than do boys and men [17,18,19].

The survey reveals the age distribution (Fig.1.1) of the respondents as 15-20 years is 12% (24); 21-30 years is 37.5% (75); 31-40 years is 19% (38); 41-50 years is 17.5 % (35); 51-60 years is 9.5% and 9 respondents constituting 4.5 % do not know their age.

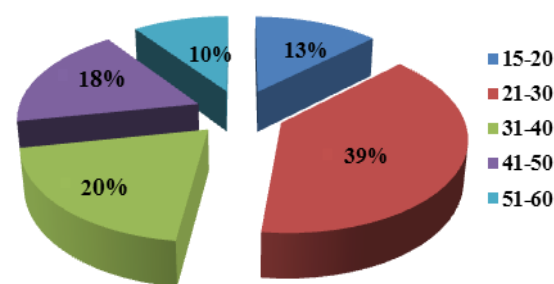


Figure 1.1. Age distribution of people who like fruits

Age also appears to influence fruit consumption. For example Anderson and Hunt, and Reime *et al* report that dietary choices including fruits and vegetables are largely affected by demographic factors like age and gender [26]. Thirty-nine percent (21-30 years) of respondents liked fresh-cut fruits (Fig.1.1). This age group may be in tertiary institutions and may have been well informed about the benefits of fruits in addition to them being convenient foods [20]. This could also be due to cross-cultural influences in the study area. In adolescents, consumption tends to decrease with age [21] and only thirteen percent (13%) of respondents aged 13-19 years like fresh-cut fruits. This may be due to their preference for fast foods and sweets.

Respondents aged 51- 60 years (39%) and 41-50 years (18%) do not patronize fresh fruits in Ghana. Economic, cultural and environmental factors may influence fruits' intake. Most of the benefits of consuming fruits are the prevention of a number of cancers [22, 25] and the reduction in cardiovascular disease. Thirty-nine percent 39% (78) of the respondents are married and 56% (112) are single. Only one percent is widowed (Fig. 1.2).

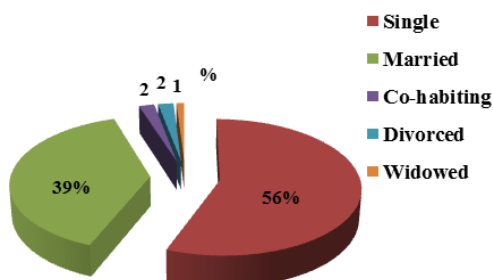


Figure 1.2. Marital status of respondents who like fresh-cut fruits

Marital status (Fig. 1.2) appears to influence fruits consumption, which may be because individuals tend to consume more fruits when eating meals with others [25]. In adults, particularly in married men (39%), marriage positively influences the amounts of fruit consumed [23, 24]. Women seem to have a positive influence on their husbands' intake frequency, amounts and variety of the fruits eaten [23] This is thought to be related to their traditional roles in the household; women handle health-related issues and more commonly shop and prepare food than do men[23,24]. Singles (56%) tend to consume more fruits and readily made cut-fruits than married couples do as shown in Fig 1.2, however in Canada, singles consume less fruits than married people [25]. Fruit consumption is low among the divorced (2%) and the widowed (1%) this is because social support appears to enhance fruit consumption [24] and in general, family factors seem to be stronger determinants in men than in women [23, 24].

Almost all the respondents 94.5% (189) like fruits of all kinds (Fig 1.3). About 5.5% (11) were indifferent and cited various reasons like 'fruits give diarrhea' or 'fruits give malaria fever'. About 40.5% (81) preferred mango to other fruits. Nineteen percent (38) preferred orange, 18% (36) preferred pineapple and 17% (34) preferred pawpaw (Fig 1.3).

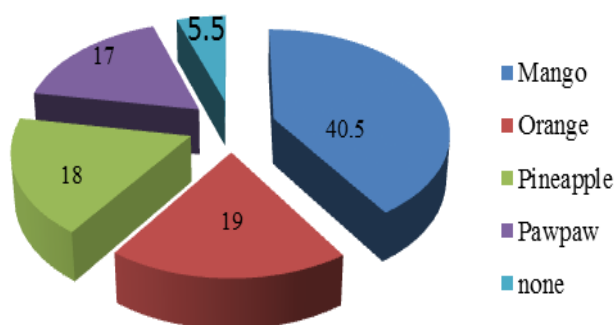


Figure 1.3. Percentages of kind of fruits liked by respondents

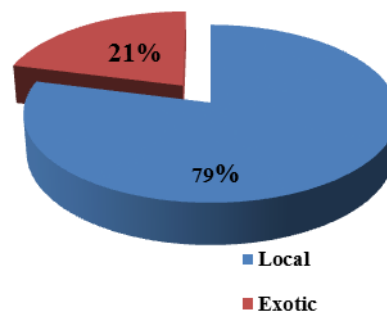


Figure 1.4. Respondents who preferred either local or exotic mangoes

The mango market is divided into the exotic varieties (which included Kent, Keitt, Palmer, etc.) and the local varieties. Seventy-nine percent (79%) of respondents preferred the local mango to the exotic varieties (21%) as shown in Fig. 1.4.

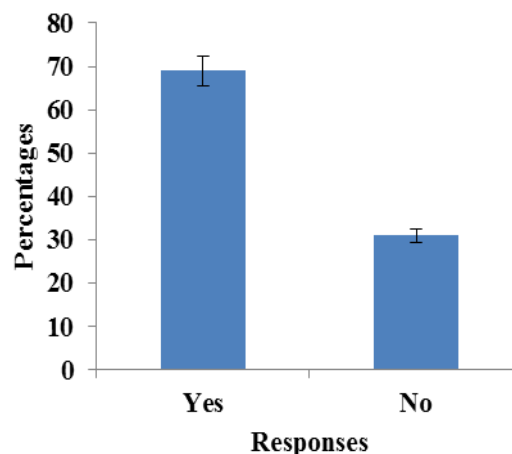


Figure 1.5. Respondents who patronise mango when in season (values are percentages with percentage error bars) Sixty-nine percent (69%) of the people who preferred mango also patronize the fruits when they are in season (Fig.1.5).

Table 2. Respondents who patronize cut-fruits

Responses	Percentage Respondents	
	Yes	No
Patronise cut-fruits	68	32
Always patronise cut-fruits	69	31

About 69 % of respondents always buy cut-fruits of any kind (Table 2). Fresh-cut fruit, although an emerging industry in Ghana, patronage is high (68%).

Education seems to have influence on fruit consumption. Ninety one (91) of respondents representing forty-eight percent (48%) of those who like fruits were University students (Fig1.6). Sunday and Mesbah [25] find out that individual educational attainment is positively and significantly associated with fruits consumption. Higher education generally could be related to greater knowledge and awareness of healthy eating. It is also likely that certain values, ideals and social influence linked to educational levels influence eating behaviours, including fruit consumption.

Senior High School students aged between 15-20 years (22%) also like fruits more than Junior High School students do and Primary School pupils aged less than 15 years and constituting only 9% (Fig.1.6).

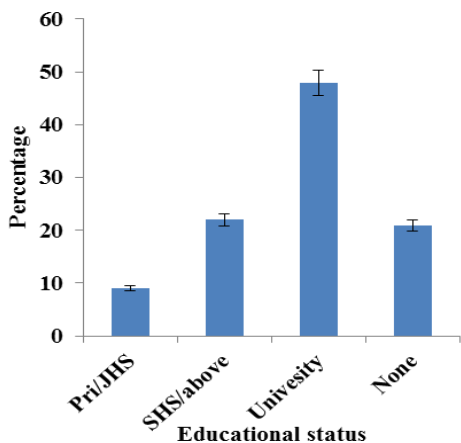


Figure 1.6. Educational backgrounds of respondents

Twenty-one percent (21%) had no formal education and might be ignorant about the health benefits of fruits and therefore they might not be consuming fruits regularly.

Results on the knowledge of irradiated foods indicate that more than half (52%) of the respondents has some knowledge about irradiated foods (Table 3). Even though they could not tell which foods were irradiated they have heard about irradiated foods. Forty-seven percent (47%) of these wants to buy irradiated foods giving reasons that irradiated foods are hygienic and safe while 53% do not want to buy irradiated foods because they perceived it to be dangerous and unsafe, associating irradiation with radioactivity and nuclear reaction.

Table 3. Knowledge and willingness to buy irradiated foods

Attributes measured	Percentage Responses	
	Yes	No
Knowledge of irradiated foods	52	48
Respondents who would buy Irradiated foods	47	53

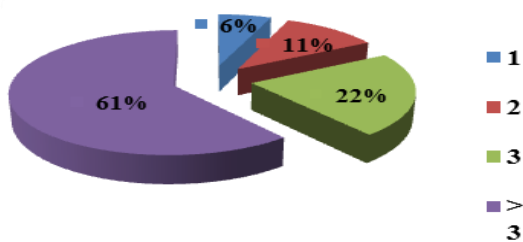


Figure 1.7. Household size of respondents

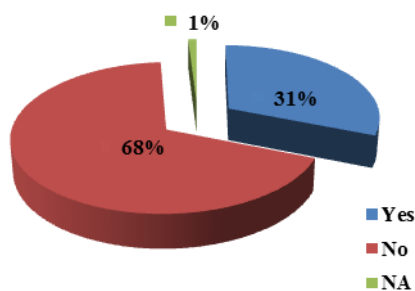


Figure 1.8. Households that patronise fresh-cut fruits

The responses reveal the influence of household size on the patronage of fresh-cut fruits (Fig. 1.7). Households greater than 3 constitute 61% of respondents who patronise fresh-cut fruits.

A large number (68%) of households of respondents do not patronise cut-fruits (Fig.1.8). Fifty-eight percent (58%) of respondents would however prefer well-packaged fresh cut-fruits sold in ice chests but others (42%) do not want either fresh-cut or re-packaged fresh-cut fruits (Fig.1.9)

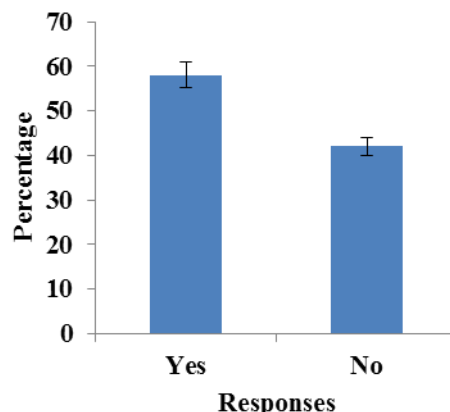


Figure 1.9. Respondents who prefer re-packaging of fresh-cut fruits in ice chest (with percentage error bars)

About 58% of the respondents would however prefer well-packaged fresh cut-fruits sold in ice chests but others (42%) do not want either fresh-cut or repackaged fresh-cut fruits (Fig. 1.9)

Conclusion

Results have shown that more males patronise fresh cut-fruits than females. Mangoes are the most preferred fruit however; the local varieties are preferred to the exotic varieties due to their smaller sizes that may not require slicing into pieces. Consumers perceive fresh-cut fruits not to be hygienically prepared and including poor packaging however, patronage of fresh-cut fruits is high among those who had formal education. There is a limited knowledge on food irradiation in Ghana. This has resulted in the wrong perception about irradiated food being radioactive and unsafe for consumption.

Recommendations

Fruits consumption should be encouraged through health and nutrition education to help reduce the risk of non-communicable diseases, improve overall health, and increase minerals intake. The production of the local mangoes should be supported by the Ministry of Food and Agriculture as they currently do for the exotic varieties (we may lose this local species in future). The Government should initiate a policy to include the supply of fruits especially the local mangoes in the Ghana School Feeding Programme as a means of discouraging the consumption of sweets and sugary pastries by pupils and students. Education on food irradiation and its benefits should be intensify by incorporating this in the educational curriculum at the basic through to the second cycle levels.

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