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DOI: <https://dx.doi.org/10.4314/acsj.v30i1.3S>



SOCIO-DEMOGRAPHIC RELATIONSHIPS AND MANAGEMENT REGIMES ON USE OF *FRUNDU* AS FERMENTED FAMINE FOOD IN URBAN NORTHERN DARFUR IN SUDAN

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ABSTRACT

Frundu, which in a local term in Darfur for fermented seeds of roselle (*Hibiscus sabdariffa* L.), is a traditional Sudanese food often used as a meat substitute during famine times. The objective of this study was to assess the relationships between socio-demographic and management regimes on the use of *Frundu* as a food security commodity in urban Darfur in Sudan. A survey involving 140 respondents was conducted in El-Fashir city markets, where *Frundu* is a popular commodity in Darfur markets. A semi-structured questionnaire and Chi square analysis were used. It was found that the period of fermentation of *Frundu* ranged from 3 to 7 days, depending on seasonal temperature. The storage period of *Frundu* was on average one year. Over 55% of the respondents acknowledged *Frundu* as critical a coping strategy when famine struck Darfur and the majority of respondents were familiar with *Frundu*. *Frundu* is becoming less popular in Darfur for several reasons; including difficulty in obtaining Roselle seeds, competition from the cheapest food items especially during non-famine time; and lack of familiarity with *Frundu* among young generations. To boost its production, processing and utilisation, farmers should be encouraged to increase its cultivation particularly because it is an important cash crops in Sudan.

Key Words: Famine, fermentation, *Frundu*, *Hibiscus*

RÉSUMÉ

Frundu, qui est les graines fermentées de roselle dans un terme local au Darfour (*Hibiscus sabdariffa* L.), est un aliment traditionnel soudanais souvent utilisé comme substitut de viande en période de famine. L'objectif de cette étude était d'évaluer les relations entre les régimes socio-démographiques et de gestion sur l'utilisation du *Frundu* comme produit de sécurité alimentaire dans le Darfour urbain

au Soudan. Une enquête auprès de 140 répondants a été menée sur les marchés de la ville d'El-Fashir la où *Frundu* est un produit populaire sur les marchés du Darfour. Un questionnaire semi-structuré et une analyse du chi carré ont été utilisés. Il a été constaté que la période de fermentation du *Frundu* variait de 3 à 7 jours, selon la température saisonnière. La durée de conservation du *Frundu* était en moyenne d'un an. Plus de 55% des personnes interrogées ont reconnu *Frundu* comme une stratégie d'adaptation essentielle lorsque la famine a frappé le Darfour et la majorité des personnes interrogées connaissaient *Frundu*. *Frundu* devient moins populaire au Darfour pour plusieurs raisons ; y compris la difficulté à obtenir des graines de Roselle, la concurrence des produits alimentaires les moins chers, en particulier dans la période d'abondance; et le manque de familiarité avec *Frundu* parmi les jeunes générations. Pour stimuler sa production, sa transformation et son utilisation, les agriculteurs devraient être encouragés à augmenter la culture de *Frundu*, parce que *Frundu* est une plante de cueillettes *commerciales* au Soudan.

Mots Clés: Famine, fermentation, *Frundu*, *Hibiscus*

INTRODUCTION

Darfur is considered one of the most drought-prone areas in the Sudan, with the bulk of the population often on the verge of starvation. Up to 80% of the populations in Darfur live in rural areas where their livelihoods rely immensely on natural resources. Low and unpredictable rainfall has placed resources and livelihoods under intense stress, coupled with frequent tribal conflicts.

Frundu is an indigenous fermented food in Sudan, made from the seeds of roselle (*Hibiscus sabdariffa* L.) (Dirar, 1993). It is locally used as a meat substitute owing to its taste and richness in protein, particularly albumin and globulins (Toukara, *et al.* 2013) and lysine. It is cooked and then processed into a solid-state fermentation (SSF) for an average 9 days (Yagoub *et al.*, 2008). *Frundu* is easy to prepare and yet stores for long periods without notable deterioration. The objective of this study was to assess the relationships between socio-demographic and management regimes on the use of *Frundu* as a food security commodity in urban Darfur in Sudan.

METHODOLOGY

A survey was carried in El Fasher city the capital of north Darfur state in western Sudan

(13.61667°N 25.35°E), a place that has become a market for agricultural crops, including *Frundu*. Specifically, the study was conducted in five units, namely El-fashir Large Market, Um Dafsu Market, livestock Market, Naivasha market and Zamzam camp Market. The survey used a sample of 140 respondents comprising women and men selected randomly using official lists obtained from local authorities. The sample size was determined using random sampling, because the population frame was unknown. Face to face interviews were conducted using a structured questionnaire. The thrust of the questionnaire was on the characteristics of the households, occurrence and frequency of famine, causes of famine, coping strategies, *Frundu* preparation and storage. The questionnaire was pretested using pre-survey visit to check the appropriateness for the survey design.

The data collected were analysed using descriptive statistics (frequency distribution) and Chi square test. The statistical package for Social Scientists version 22, was used for all the analyses.

RESULTS AND DISCUSSION

Gender aspects. The study showed significant difference ($P < 0.05$) between men and women with respect to familiarity with use of *Frundu* (Table 1). Clearly, men were

less (8.6%) knowledgeable than their female counterparts (47.9%). The higher level of female familiarity with *Frundu* was probably because females in Sudan are responsible for the preparation and handling of food including *Frundu*. Women were more involved in the handling and preparation of *Frundu*; thus presenting an advantage in the efforts to promote its use. Women are both food vendors and small farmer in Darfur. Through extension programme and micro-credit loans, women could be encouraged to grow and sell *Frundu* (Farnworth, 2010).

Also important to note, was the significant proportion of respondents that were not familiar with the importance of *Frundu* as a food security crop (43.5%). This may be due to several reasons, including (i) urban communities comprise of mixed ethnic groups, each with a different culture and

tradition, including lifestyles and feeding habits, (ii) urban communities are less vulnerable to food insecurity stresses than their rural counterparts, (iii) urban communities bear different coping mechanisms (because of a variety of income sources) against famine stresses compared to their rural counterparts, (iv) urban communities are exposed more to the influence of western European culture than rural communities.

Respondent age. Results showed that age of the respondent was a significant ($P < 0.05$) factor in knowledge about *Frundu* in terms of its spread in urban Darfur (Table 2). Generally, respondents of ≥ 40 years were the most familiar with use of *Frundu* (52%). This was followed by the age bracket of 20 - < 40 years with a response rating of 45%. This confirms that age is a major factor behind experience

TABLE 1. Effect of gender on knowledge about using *Frundu* as a food security crop in Darfur, Sudan

Gender	Using <i>Frundu</i> (%)	Not using <i>Frundu</i> (%)	Total (%)
Female	47.9	36.4	84.3
Male	8.6	7.1	15.7
Total	56.5	43.5	100%

Chi-value = 0.885

TABLE 2. Effect of age of respondents on knowledge of use of *Frundu* and age as a food security crop in Darfur, Sudan

Age (years)	Using <i>Frundu</i>	Not using <i>Frundu</i>	Total
<20	0	2.1	2.1
20-40	17.1	28.6	45.7
>40	38.6	12.9	51.5
Missing data	-	0.71	10.71
Total	55.7	44.	100

Chi-value = 0.000

with life practices (OCED, 2019) and should thus be leveraged to develop *Frundu* as a food security crop in urban Darfur.

The significant proportion of respondents in the 20-40 year bracket in this study may also have been due to the more recent massive migration of young people from rural to urban areas (Cohen *et al.*, 2006). Young people in Sudan increasingly lose touch with traditional ways of living, including traditional food types owing to the invasion of easy to prepare western European fast foods (Kuhnlein *et al.*, 2013). There is great concern that traditional knowledge about local food types in Sudan, as in other African countries, may be lost with time, as older generations gradually pass away. To preserve local knowledge about indigenous food types, educational programmes about them should be included in school curricula. Dissemination programmes by youth clubs and civil societies should be encouraged to promote this knowledge.

Occupation of respondent. The effect of type of occupation on the level of use of *Frundu* was highly significant ($P < 0.01$) (Table 3). Trade was the largest occupation of respondents who were the most knowledgeable about use of *Frundu* (39%). These were followed by those in the agricultural/pastoral sector (10%). This is not surprising because trade is the predominant occupation of urban areas. Since traders are the largest group using *Frundu*, to disseminate

its use further, it should be made easily available for them through various means including women food vendors. The latter are becoming increasingly important food distributors in Sudanese cities. This is particularly important because of the afore-mentioned knowledge of women about preparation of *Frundu*. Also, they represent the cheapest type of food vendors. Restaurants specialised in indigenous food may also be encouraged to include *Frundu* in their menu.

Income status. The effect of monthly income earned by a respondent on the level of use of *Frundu* was significant ($P < 0.05$) (Table 4). Respondents who had monthly incomes less than 8000 Sudanese pounds (35%) used *Frundu* the most. Therefore, it is the low income earners that accounted for the use of *Frundu* the most. This could be due either to community status perception of *Frundu* against other more mainstream urban food stuffs, or the relative price among available food stuffs within the market area. Efforts geared to developing *Frundu* as a food security commodity ought to explore this further.

Period of fermentation. There were significant differences among respondents for durations of fermentation of *Frundu* in urban Darfur in Sudan (Table 5). Most respondents (52.9%) used the longest fermentation period of seven days. This was followed by five days (27.1%) and three days (12.9%). Fermentation

TABLE 3. The occupations associated with the users of *Frundu* in Darfur in Sudan

Occupations	Using <i>Frundu</i>	Not using <i>Frundu</i>	Total
Agriculturalists/ pastoralists	10.7	6.4]	17.1
Officer	5	6.4	11.4
Agricultural/ traders sector	38.6	11.4	50
Others	2.1	19.3	21.4
Total	56.4	43.6	100

Chi-value = 0.00

is vital to induce palatability of *Frundu* for the consumers. However, it may be responsible for the modest levels of use of *Frundu* observed among urban communities in Darfur (Tables 1-4). Mohammed and Yagoub (2007) also reported that *Frundu* was traditionally prepared by cooking roselle seed and then fermentation periods up to 9 days. Further investigations are necessary to establish the optimum fermentation period for the food commodity.

***Frundu* storage.** Up to 95% of the respondents reported storing dried *Frundu* safely for up to one year; while the rest gave no answer (Table 6). This adds to the potential value of *Frundu* as a suitable food security crop, particularly during famine periods. On the other hand, the urban communities may

be limited by storage space in order to benefit from this food stuff. This result is in line with the findings of Harper and Collins (1992) who stated that the storage of dried fermented products continued up to a year without physical quality deterioration. Further investigations are necessary to rationalise the suitability of storage period in the urban Darfur.

Method of storage. Up to 93.6% of the respondents reported storing *Frundu* in closed dried containers at room temperature; while the rest kept it in the kitchen in open containers (Table 7). This result conforms to that of Kamala *et al.* (2018), who stated that the closed container storage method preserved food from contamination and changes in quality. Other modern storage methods such

TABLE 4. Levels of monthly income and community use of *Frundu* in urban Darfur in Sudan

Monthly income (Sudanese pound)	Using <i>Frundu</i>	Not using <i>Frundu</i>	Total
≤4000	19.3	25	44.3
4001 - 8000	25	10	35
8001 - 12000	10.7	5.7	16.4
12001 - 15000	1.4	2.9	4.3
Total	56.4	43.6	100

Chi-value = 0.012

TABLE 5. Period of fermentation used for processing *Frundu* in urban Darfur in Sudan

Fermentation period (days)	Frequency	Percentage
Three	18	12.9
Five	38	27.1
Seven	74	52.9
Missing data	10	7.1
Total	140	100

P-value = 0.000

TABLE 6. Storage periods of *Frundu* among respondents in urban Darfur in Sudan

Storage period (months)	Frequency	Percentage
12	133	95
Missing data	7	5
Total	140	100

P-value = 0.002

TABLE 7. Types of storage for *Frundu* in urban Darfur in Sudan

Storage method	Frequency	Percentage
Closed container	131	93.6
Open container	9	6.4
Total	140	100

P-value = 0.002

TABLE 8. Level of use of *Frundu* during famine periods in urban Darfur in Sudan

Using <i>Frundu</i>	Frequency	Percentage
Using	80	57.1
Not using	51	36.4
Missing data	9	6.4
Total	140	100

P-value = 0.000

as lypholisation, some of which require limited space need to be investigated for the urban low income crowded communities.

Respondents' distribution. Most of the urban dwellers in Darfur (57.1%) used *Frundu* food stuffs during famine periods (Table 8), indicating the growing significance of this type

of food among the communities. However, the proportion of nonusers of *Frundu* during famine times remains significant (36.4%), suggesting a dismal role of the food commodity compared to what is reported for the rural communities (Vorley and Lançon, 2016). This again may be reflective of the diversity of ethnicity and feeding habits characteristic of urban environments (Global panel, 2017); ease of availability of a variety of alternative food stuffs, and access to a diversity of sources of income.

CONCLUSION

Frundu is less important as food security commodity among urban communities compared to their rural counterparts in Darfur in Sudan. The main socio-demographic factors that are directly related to its use include gender, age, occupation, income, preparation and storage method, and length of fermentation. There is need for further investigations as to the reason why *Frundu* is less preferred by a sizable urban population despite its long shelf life and nutritional value.

ACKNOWLEDGEMENT

The authors acknowledge the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM) funding this study under the project titled "Improvement of Indigenous Coping Strategies of Famine-stricken in Darfur States, Sudan", grant number: RU/2018/CARP+/07C.

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