



A Study on the Production and Consumption Pattern of Kunun-Zaki: A Cereal Based Ethnic Fermented Beverage of Northern Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. The study and preparation of the manuscript was undertaken by author OA under the supervisions of authors OOA and IN. All authors read and approved the final manuscript.

Research Article

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ABSTRACT

Aims: This study examines the consumption pattern and the existing methods of kunun production in some selected states of Central Nigeria.

Study Design: Field data collection using structured questionnaires on the demography, geographical spread, production and consumption pattern of kunun.

Place and Duration of Study: Federal capital territory-Abuja, Niger and Nassarawa states of Nigeria during rainy and dry season (12 month)

Methodology: A total of 400 questionnaires were administered in person within the study area to traditional kunun producers, marketers and consumers. The data collected from the field were collated.

Results: Of the three hundred and sixty two (362) respondents, 67% were female; while those within the age brackets of 26-30yr accounted for 26% of those producing kunun in the study area. Uneducated persons accounted for 30% of those producing kunun while primary, secondary and tertiary school graduates accounted for 20, 30% and 17% respectively. Furthermore, kunun-zaki was observed to be the most popular (67%) beverage among the other kununs (kunun-8.8%, kunun gyada-7.7%, kunun yagi-6.4% and kunun acha-3%) produced within the study area.

Conclusion: Since all the kununs produced in this study area were observed to have a

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limited shelf-life (<24h); there is therefore the need to enhance the quality of its production using scientific processing technology.

Keywords: Kunun; consumption pattern; study survey.

1. INTRODUCTION

'Kunun zaki' is a traditional cereal fermented non-alcoholic beverage popular in the Northern part of Nigeria with immense socio-economic and nutritional benefits to its consumers [1]. Tamang [2] defined ethnic fermented foods as foods produced by ethnic people using their native knowledge from locally available raw materials of plant or animal sources either naturally or by adding starter culture and according to this author, the term 'ethnic' denotes community-based fermented foods and beverages prepared by different ethnic people using their native or traditional knowledge. Each community in the world has its distinct food culture which symbolizes its heritage and the socio-cultural aspects of its ethnicity [3]; and according to McWilliams [4], geographical locations, environmental factors, availability of plant and animal sources and social grouping are what characteristically symbolizes the culture of a people. Food has always been one of the key elements of the culture of any society and had played a prominent part in the development of the cultural identities and resources of a people and this had helped in bringing people of different cultures together and, at the same time reflects on their heritage and ways of life [5].

Gaffa et al. [6] carried out a study on the traditional production and consumption pattern of kunun in Bauchi and Gombe states (North-east Nigeria) and reported that kunun zaki, in spite of having poor storage stability was most popular among all the kununs produced in their study area. Food consumption survey is an indispensable tool for the assessment of the nutritional intake and pattern of food consumption of a community [7] and provides information on the socio-economic and demographic characteristics of the population from which the sample is taken as well as the nutritional content and quality of diets. The objective of this study is to examine the consumption pattern and existing methods for kunun zaki production in selected states of Central Nigeria.

2. MATERIALS AND METHODS

2.1 Study on the Existing Methods of Kunun Production

A survey of the existing methods for kunun production in selected states of Central Nigeria (Niger, Nassarawa, and Federal Capital Territory, Abuja) was conducted by means of structured questionnaires.

2.1.1 Data collection

A questionnaire was designed to collect data on traditional kunun production, consumption and storage. A total of four hundred questionnaires were administered in person to those who were willing to give the needed information.

2.1.1.1 Survey instrument used

Demographic data related to gender, age, academic qualifications occupation and geographical spread were collected from both producers and consumers of kunun. Other information collected included degree of preference of kunun consumptions, types of kunun produced, ingredients, spices and types of cereal grains used and production process of each kunun type. Some of the constraints experienced in field data collection included: language barrier, inability and unwillingness of some of the respondents to fill the data form and therefore had to be helped.

3. RESULTS

3.1 Survey of Methods of Kunun Production: Demographic Characteristics of Respondents

The demographic characteristics of 362 respondents producing kunun within the study area are shown in Table 1. About 67% of the respondents were female and those within the age bracket of 26-30%yr accounted for 26% of those actively involved in kunun production. The uneducated persons accounted for about 30% of those producing kunun while secondary and primary school leavers accounted for 33 and 20% of kunun producers respectively and tertiary school graduates accounted for 17% (Table 1).

Table 1. Demographic characteristics of respondents making kunun in FCT-Abuja, Niger and Nasarawa states)

Observations	Demographic characteristics	Number of respondent	Percentage
Gender	Male	118	32.60
	Female	244	67.40
Age (years)	Below 20	52	14.36
	21 – 25	85	23.48
	26 – 30	93	25.70
	31 – 35	79	21.80
	36 – 40	45	12.43
	Above 40	21	5.80
Academic qualification	Un educated	107	29.56
	Primary school leavers	73	20.17
	Secondary school leavers	120	33.15
	Tertiary school graduates	62	17.13
Geographic region	Kwali	37	20.90
	Gwagwalada	79	44.63
	Nasarawa	44	24.86
	Akwanga	17	9.60
	Minna	12	38.92
	Bida	113	61.08
Occupation	House wife	93	25.70
	Farmers	57	15.75
	Self employed	77	21.30
	Students	85	23.50
	Civil servants	50	13.81

3.1.1 Frequency of kunun production

The result as shown in Table 2 indicates that 48% of the respondents produce kunun on a weekly basis while 26% of them produce kunun daily and or monthly. Also, 97% of kunun was produced during the dry season and 3% during the rainy season (Table 2).

Table 2. Production, processing and consumption pattern of respondents making kunun in FCT-Abuja, Niger and Nasarawa states

Observations	Demographic characteristics	Number of respondent	Percentage
Frequency of kunun consumption	Daily	150	68.2
	Occasionally	70	31.8
Frequency of kunun production	Daily	80	25.8
	Weekly	150	48.4
Period of production	Monthly	80	25.8
	Dry season	329	97.3
	Rainy season	9	2.7
Packaging material	Polyethylene	103	41.4
	Plastic bottle	127	51.0
	Calabash	19	7.6
Social class of kunun consumers	All class	210	76.4
	Local married women	40	14.5
Storage (shelf-life)	Middle class women	25	9.1
	1day	33	15.6
	2day	127	59.9
	3day	47	22.2
	4day	5	2.4
Processing equipment	Earthen pot	9	2.5
	Plastic bucket	310	85.9
	Calabash	28	7.8
	Metal buckets	14	3.9

3.1.1.1 Quality of the different kunun and their preferences

Nine different types of kunun were identified in this study (Table 3). These include kunun zaki, kunun gyada, kunun acha, kunun dawa, kunun kanwa, kunun tsamiya, kunun yagi, kunun aya and kunun cheku. Of the nine types identified, kunun zaki was observed to be generally preferred (67.4%) followed by kunun tsamiya (8.8%), kunun gyada (7.7%), kunun yagi (6.4%), kunun acha (3%), kunun aya (2.2%), kunun cheku (1.9%), kunun dawa (1.7%) and kunun kanwa (<1%). Millet and ginger were the popular grains and spices used more frequently in kunun production (Table 3).

3.1.1.1.1 Frequency of production, consumption and social class

About 68% of the respondents consumed kunun on daily basis while 32% of them drink kunun occasionally (Table 2). Generally, kunun is consumed mostly by all classes of people (Table 2) while local women and middle class women accounted for 14.5% and 9.1%

respectively of those consuming kunun on daily basis. The results obtained during the survey show that about 86% of the kunun producers uses plastic buckets in processing (steeping and fermentation) the product; earthen pots, calabash and metal buckets accounted for 2.5, 7.8 and 3.9% respectively (Table 2). Fifty one percent of kunun producers packaged and hawk their products in re-used plastic bottles, 41% in polyethylene bags and 7.6% in calabashes. The shelf-life of these products ranged from 1-4 days. Only about 60% of the kunun produced stores for 2 days while 15.6, 22.2 and 2.4% store for 1, 3 and 4 days respectively.

Table 3. Types of kunun produced, degree of preference and the ingredient used

Kunun type	Number of respondent	Degree of preference (%)	Ingredient
Kunun-zaki	244	67.4	Millet, sorghum, maize, wheat, malted millet, ginger, clove, black pepper, sweet potato
Kunun-gyada	28	7.73	Millet, groundnut, rice, sugar, ginger
Kunun-acha	11	3.03	Acha, garden egg, ginger, milk
Kunun dawa	6	1.66	Guinea corn, ginger, clove, sugar
Kunun-kanwa	3	0.83	Millet, sorghum, potash, ginger
Kunun-tsamiya	32	8.84	Millet, sorghum, tsamiya, red pepper, sugar
Kunun-yagi	23	6.35	Millet, sorghum, ginger, clove, red pepper, black pepper, sugar
Kunun aya	8	2.21	Millet, aya, sugar, ginger, clove
Kunun cheku	7	1.93	Guinea corn, maize, ginger, black pepper, sugar

4. DISCUSSION

A study of the existing structure of kunun production and consumption pattern in some selected states in Central Nigeria (Niger, Nassarawa and FCT-Abuja) shows that women dominated kunun production (67%), followed by males (23%); housewives, students, self employed, farmers and those within the age brackets of 26-30yr were actively involved in its production and or consumption (Table 1). The active involvement of women and farmers in the production and consumption of kunun is expected since women are the main producers for family consumption, entertainment of guests and income generation; while farmers use it as a refreshing, taste quenching and instant energy giving drinks. The involvement of students and un-employed can be explained as this could solely be for income generation. However, the lesser involvement of tertiary school graduates (17%) and greater participation of un-educated (30%) and semi-educated (primary and secondary school leavers; 20 and 33% respectively) persons in kunun production could explain the reason while kunun production is still on a small-scale level. With the renewed interest by scientist in characterizing the fermenting microorganisms associated with kunun zaki production [8] and as well as developing a more scientific process for its production using accelerated processing methods [9] and preservation using freeze-drying techniques [10] which could facilitate the production on a large-scale.

Of the nine types of kunun identified within the study area, kunun zaki was highly preferred (67%) followed by kunun tsamiya (8.8%), kunun gyada (7.7%) and lastly, kunun kanwa (<1%). Millet was the popular grains used; ginger, clove and black pepper were the spices of choice (Table 3). A similar observation was made by Gaffa et al. [6] in their study of the traditional production and consumption pattern of kunun in the North-eastern region of Nigerian. Millet is the dominant grain grown within the study area, followed by rice which explains why it is the preferred grain of choice by kunun zaki producers. As shown in this study, kunun zaki production was highest during the dry season, this could be explained by the fact that kunun zaki is a thirst quenching and refreshing drink which is usually served during social occasions like wedding, child naming ceremonies and, fasting periods. These activities are at its peak during the dry season in various localities within the study area. Kunun is produced weekly by most of its manufacturers, the reason could be attributable to the fact that it takes between 36 -72h to produce the product depending on the grains used and the production method employed. Therefore, improvement in the method of production of kunun could increase the frequency of its production (Table 3).

As was observed in this study, greater percentage of the commercial kunun producers (51%) market their products using plastic bottles while others in polyethylene bags (41%) and calabashes (7.6%, Table 2). Hawking kunun in used plastic bottles may pose a health problem as these containers were recycled without adequate sterilization, this may be responsible for the poor shelf-life associated with the product. Packaging is an integral part of food processing operation. The food packaging material influences the gaseous exchange between the food and its environment and this affects the quality either adversely or beneficially [11]. The ideal food package material would be beneficial or at least non-detrimental in its interaction with the food. Also, marketing kunun in open calabash possesses a greater risk of contamination by spoilage and pathogenic microorganisms and these could be responsible for the transmission and spread of infectious diseases [12]. There is therefore, the need by the governmental agencies such as National Agency for Food, Drug, Administration and Control (NAFDAC) to organize training program at the local level in order to enlighten the local producers of the importance of hygienic conditions during production and sales of food drinks meant for public consumption. Also, a routine health examination of these producers should be carried out at regular intervals to ascertain their suitability to produce foods for sales to the public. It is of interest to note that most kunun producers' use plastic buckets as local fermenting vessel while a lesser percentage of these producers use metal bucket, earthen pots or calabash (Table 2). Use of metal buckets possess the risk of chemical poisoning that could arise if the metal container had shown signs of rusting; resulting in leaching out of poisonous materials into the fermenting medium, use of plastic containers could reduce such risk.

5. CONCLUSION

Kunun-zaki was identified in this study to be the most preferred (67%) among the nine types of kununs produced in the study area. Housewives were observed to be actively involved (26%) in kunun production. The lesser involvement of tertiary school graduates (17%) and the greater participation of un-educated individuals (30%) in kunun production may be the reason why its production is still on a small-scale level; there is therefore, the need for the development of a scientific process for its production in order to encourage large-scale production.

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COMPETING INTEREST

Authors have declared that no competing interests exist.

REFERENCES

1. Efiuvwevwere BJO, Akoma O. The microbiology of kunun zaki a cereal beverage from Northern Nigeria during the fermentation (production) process. *World Journal of Microbiology and Biotechnology*. 1995;11:491-493
2. Tamang JP. Diversity of fermented foods. In: Tamang JP, Kailasapathy K, editors. *Fermented foods and beverages of the world*. New York: Taylor and Francis Groups; 2010
3. Tamang JP, Samuel D. Dietary cultures and antiquity of fermented foods and beverage. In: Tamang JP, Kailasapathy K, editors. *Fermented foods and beverages of the world*. New York: Taylor and Francis Groups; 2010
4. McWilliams M. *Food around the world: a cultural perspective*. India: Pearson Education Pub. Ltd, New Delhi; 2007
5. Mugalavai VK, Kiama FW, Omutimba HN. Using traditional cuisine contexts as a channel for inter-ethnic social integration in Kenya. *International Journal of Social Science Tomorrow*. 2012;1(2):1-4.
6. Gaffa T, Jideani IA, Nkama I. Traditional production, consumption and storage of kunun – a non alcoholic cereal beverage. *Plant foods for Human Nutrients*. 2002;57:73-81.
7. Tamang JP, Thapa N, Rai B, Thapa S, Yonzan H, Dewan S, Tamang B, Sharma RM, Rai AK, Chettri R, Mukhopadhyay B, Pal B. Food consumption in Sikkim with special references to traditional fermented foods and beverages: A micro-level survey. *Journal of Hill Research, Suppl issue*. 2007;20(1):1-37.
8. Agarry OO, Nkama I, Akoma O. Production of Kunun-zaki (a Nigerian fermented cereal beverage) using starter culture. *International Research Journal of Microbiology*. 2010; 1(2): 018-025
9. Akoma O, Agarry OO, Nkama I. Influence of thermal enzymatic hydrolysis of cereal starch on the physico-chemical quality of kunun-zaki (a fermented non-alcoholic cereal beverage). *International Journal of Applied Biology and Pharmaceutical Technology*. 2010;1(3):821-829.
10. Nkama I, Agarry OO Akoma O. Sensory and nutritional quality characteristics of powdered kunun zaki (a Nigerian fermented cereal beverage). *African Journal of Food Science*. 2010;4(6):364-370.
11. Heidelbaugh ND, Karel M. The function of food packaging in preservation of nutrients. In: Miloslav R, editor. *Handbook of nutritive value of processed food*. vol. 1. USA: CRC Press Inc., Florida; 1982.

12. Onuorah SI, Adesiyun AA, Adekeye JO. Occurrence of *Staphylococcus* and coliforms in kunun zaki in the utensils used in its preparation in Samaru, Zaria. *Journals of Food and Agriculture*. 1987;1:31-34.

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