Water and Beverage intake among Civil Servants in Southwest Nigeria

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ABSTRACT

Background: *The quantitative water intake dataset for any country in Sub Sahara Africa is rare, and few published studies have reported quantitative intakes of even other beverages in Nigeria. This study determined the drinking water intake (DWI), quantity, and diversity of Total Beverages Intake (TBI) among civil servants in Southwestern Nigeria according to gender, age, Socioeconomic Status (SES), and Body Mass Index (BMI).*

Methods: *This study is a descriptive cross-sectional study carried out among 300 civil servants (male n=134, female n=166) in four Southwestern states of Nigeria. The main tool for data collection was an Interviewer administered multi-component questionnaire. Data were analysed using descriptive and inferential statistics.*

Results: *Overall, 62.6% of the respondents were within grade level 7-12; DWI contributed 70% and 72% to TBI of males and females, respectively. TBI also varies between states ($p< 0.001$) and BMI ($p<0.001$) but not between SES ($p=0.45$), age ($p=0.57$ and sex ($p=0.97$). The mean DWI by females was higher than the recommendations. However, only 52% of all subjects (53% of all females and 51% of male subjects) had TBI that exceeded fluid intake levels recommended. Overall, the differences between males and females were significant for water intakes ($p=0.003$).*

Conclusion: *Water from beverages did not meet the International intake levels for almost half (48%) of subjects. The difference in males and females were significant for intakes of water*

Keywords: Water Intake, Beverages, Fluid intake, water consumption, Civil servants

Introduction

Quantitative data on the intake of most nutrients by Nigerians are fairly available except for water, which happens to be the most important nutrient of all (1). Indeed, the quantitative water intake dataset for any country in Sub Sahara Africa appears to be non-existent. However, in the tropical zone, studies on workers in Indonesia, (2) Bolivia (3) and Ecuador have quantitatively addressed water and beverage intakes in humid tropical environments. Very few published studies have reported quantitative intakes of even other beverages in Nigeria. The only nationally coordinated food and nutrition survey conducted in Nigeria to date (4) was conducted almost 20 years ago and did not report beverage intake values. To the best of our knowledge, there is no nationally coordinated study on beverage intake in Nigeria. Other localised fluid intake/consumption studies addressed either prevalence and motives for consuming specific

beverages like energy/sports drinks (5,6), indigenous non-alcoholic drinks(7), proprietary non-alcoholic (8,9), and alcoholic drinks(10). In the case of those that reported intake figures? 60 cl bottle of alcohol) (10), the figures were not obtained through standard dietary recall procedures. Therefore, useful as these localised studies are in providing insights on some factors at play in beverage consumption, they are limited in that they do not provide quantitative data at the scope and depth that are robust enough to provide a broad picture of the range and quantity of water intake in Nigeria. This information is vital for designing and implementing targeted interventions for achieving sustainable optimal nutritional and health status(11). There are other important reasons why data on water intake status are very important. For example, the effects of lack of water (dehydration) on body functioning, particularly on cognition, have long been established. Even mild dehydration can lead to poor concentration, alertness, and short-term memory. Popkin et al. (12) posited that these might be of special concern to certain age groups and those operating in hot climates.

Consequently, for a group of civil servants entrusted with planning, advising, and implementing government policies in a tropical environment like Nigeria, their hydration status should be a legitimate concern and scientific interest. This present study is an attempt to fill a part of this gap. The main objective of the study was to describe the quantity and adequacy of beverage intake among civil servants in the four most populous Southwestern States of Nigeria

METHODOLOGY

2.1 Study Location

The area referred to as South-Western Nigeria consists of six states (Lagos, Ekiti, Ogun, Ondo, Oyo, and Osun) out of the 36 states of Nigeria, situated at the southwestern corner of River Niger. The landscape ranges from coastal/riverine to thick rain forest. The area is inhabited mainly by the Yoruba ethnic group, who are mostly agrarian. However, extensive rural-urban migration has resulted in many people seeking employment in government establishments. The proliferation of distilleries, breweries factories, and advertisement of beverages by food specialists in urban cities is on the rise. Indeed, two (Lagos and Ibadan) of the most populous Nigerian cities are located within Southwest Nigeria.

Study Population and Sampling

Civil service is a major part of public service in Nigeria. It is a body of civil servants whose responsibilities are to plan, advise, and implement government policies in specialised ministries and departments. This study is a descriptive cross-sectional one carried out in four southwestern states of Nigeria between July and September 2019. The study population consisted of a permanent administrative staff working at the headquarters (Secretariat) of the selected states. Participants must have spent a minimum of two years in the service of the state. Pregnant, lactating women and those who had called in sick 24 hours before the interview day were excluded. The ministries were the primary sampling units, and individual civil servants were the final sampling units. The minimum sample size was calculated using the sample size formula (13)for estimating simple proportions.

Since part of the objectives of this study is to estimate the proportion of subjects that are not meeting water intake recommendations, a prevalence value of 35±2.5% was used (14–16). The choice of this value was based on the pilot survey results and an earlier study on beverage consumption patterns (17) in the survey area. The margin of error was put at 5% and the anticipated non-response rate at 10% to obtain a minimum sample size of 294. However, a total of 300 sample size was adopted

A multi-stage sampling procedure was used. In the first stage, four states (Lagos, Ogun, Ondo, and Oyo) out of the six were purposively selected because they are the most populous. For the second stage, ministries to be sampled in every state were selected by balloting. The four states selected have an average of fifteen ministries, out of which ten were selected by balloting for each state. In the third stage, respondents were randomly selected from the sampled ministries. The number of civil servants to be interviewed was proportionally allocated to size as follows; Lagos and Oyo had 100 respondents each, while Ogun and Ondo had 50 respondents each. At each selected Ministry, the serial number assigned to each name in the nominal list available in the general office was written on small pieces of paper. These numbers were used in the balloting for the civil servants finally selected as participants

2.3 Ethical Approval

Ethical approval was obtained from the Ogun State Ministry of Health (Ref: HPRS/381/304, 27th of May 2019). In every Ministry surveyed, permission was obtained from either the Permanent Secretary or the Commissioner's office. A full description of the aim and objectives of the study was provided to every participant, with a clear indication of the nature of the

questions. Firm assurances were also given to them about the commitment of the research team to preserve the confidentiality of all the information provided. In line with the principles of informed consent, they were all given the option to participate voluntarily or not in the survey. Subsequently, those who consented signed individual consent forms. The participants were not given any monetary or other material incentives.

2.4 Data Collection and Analyses

The main tool for data collection in this study was a multi-component questionnaire. The questionnaire consisted of three sections: Demographic and socioeconomic, anthropometry, and 24-hr intake recall. Questions on demographic, socioeconomic, and anthropometry were adapted from the Nigeria Food Consumption and Nutrition Survey (15). Interviews were face-to-face conducted by trained Nutritionists/Dieticians who are veterans of earlier nutrition surveys in the study area. In addition, a one-day training of these Interviewers was conducted to refresh and further hone their skills.

The Demographic/Socioeconomic section solicited information on respondents' age, gender, marital, and income status. The age ranges were presented in four age cohorts: <25, 25—39, 40-50, and >50 years. Four indicators were used to assess the respondents' socioeconomic status: maximum educational level achieved, Marital status, Grade level, and Income.

Maximum educational levels achieved were presented in four categories; Primary, Secondary, Diploma/Certificate, and University degree. Grade Level (GL) represents seniority level in the service and reflects a programmed mix of qualification, work performance, and experience. Thus, GL 1 represents the lowest level, while GL17 is the highest. In the questionnaire, GLs were grouped into three; GL 1-6, GL. 7-12, and GL>12. Incomes per month of respondents in local currency (Naira) were presented in six categories as follows; <19,999.00, 20-29,999.00, 30-59,999/00, 60—99,999.00, 100-200,000.00, and >200,000.00.

The 24-hr intake recall has been recommended (15) to determine fluid intake, especially where the 7-day diary method is unsuitable. Indeed, many countries like Belgium, Hungary, Iceland (17), and the USA (18) have used data from 24-hr dietary recall for establishing their National water intake recommendations. This present study employed the Multiple pass 24-hr intake recall procedure(19) to capture fluid intake during and outside meal events, at home and outside the home. The probes used in this study have been published (20) earlier. The fluid volume consumption estimation was aided by using local cups, mugs, and bottles.

The fluids recorded are similar to those encountered by earlier workers in communities in developed countries and were classified into the following categories: Drinking water intake, such as tap water, bottled water, and sachet water, and all beverages taken. Pilot testing of the questionnaire was conducted earlier in the survey area to ensure the clarity of the questions. The recalls were administered on one weekday and one weekend day; the average of the two was calculated and used for final analysis. Data collection lasted from July to September 2019.

2.5 Statistical analysis

Data analysis was conducted to test gender and sociodemographic variations in beverage consumption. Means and standard errors were calculated for continuous variables while proportions with percentages were calculated for categorical variables, EPI- Info stats package (Version 7.0) was used to analyse the anthropometric data. Associations of beverage intakes with demographic and socioeconomic characteristics were determined using analysis of variance (ANOVA), while gender differences were determined by T-test. Statistical significance was set at $p<0.05$.

3.0 RESULTS

3.1 Socio-Demographic Characteristics

Table 1 contains the demographic characteristics of the subjects in the study. There were more (55.3%) females than males (44.7%), with almost 80% being married. Respondents aged 25 to 49 years old constituted 71 % of the study population. Notably, most subjects (83.0%) were in the higher GL category. The monthly income (Naira) levels of the respondents varied, ranging from ≤19,999 (2.3%), which was the national minimum wage at the time of this study, to over 200,000 (1.7%), for respondents in the directorate cadre. Moreover, the education level shows that more than half (56.6%) were first degree holders from tertiary institutions, while 30% were diplomates, and 11.7% completed only secondary school education.

3.2 Drinking Water Intake and Total Beverage Intake

The drinking water intake (DWI) and the total beverage intake (TBI) by demographic characteristics are also presented in Table 1. DWI contributed 70% and 72.6% to the total beverage

intake of males and females, respectively. DWI encountered in this study came from four main sources, namely tap, bottle, sachet, and well. Civil servants in Oyo state had the highest mean DWI intake (3264.7±150.13 ml) per day, and females had more DWI (2969.1±129.68 ml) than males (2853.96±98.17 ml). Subjects with the lowest income had the least water intake (2317.86±450.02 ml), and participants aged 40-49 years old had the highest DWI (3116.68±156.76 ml). Significant variations were found in the intake across states (p=0,012) and between sexes (p=0.03), while the variations in water intake across income levels (p=0.358) and age (0.272) were not significant. Moreover, total beverage intake showed that respondents in Oyo state had the highest mean TBI intake (4755.55±183.46 ml) per day and males (4392.23±155.96 ml) had more beverage than females (4087.26±146.45 ml). The respondents with monthly income between ₦ 100,000-200,000 had the highest beverage intake (4724.57±274.53 ml). Participants aged ≥50 years old had the highest TBI (4348.61±235.76 ml). There was no significant variation in the beverage intake among income levels, age, and sex (p=0.45, 0.569, 0.969), but intakes across states significantly vary (p<0.001).

Table 2 shows the contribution of the various water sources to total beverage intake according to sex. Sachet water was the most frequent source of drinking water among males and females (1642.91±92.57, 1733.68±89.23 ml), and drinking water contributed 64.98% and 72.64%, respectively. Overall, the differences in intakes between males and females were significant for water (p =0.003).

4.0 DISCUSSION

Drinking Water

A few challenges are obvious in an attempt to discuss the results of this study in the context of results from earlier published studies. Firstly, there is the well-documented (21) sparsity of individual-level intake data from non-industrialized populations to compare. One consequence is that recommendations on fluid intakes are based mostly on data obtained from communities that are different in industrialisation, ambient temperature, level of physical activity, and dietary patterns. The extent to which these recommendations match the water needs, especially under high ambient temperatures, still has to be established. Additionally, there are still significant gaps in the food composition databases available such that meaningful computation of water intake from the water content of foods, especially cooked foods, becomes problematic. Comparisons with the results of other earlier studies are still nonetheless desirable.

For male subjects, the mean drinking water intake was higher than the Dietary Reference Value recommended by EFSA but lower than the Requirement level and Adequate Intake (AI) level recommended by WHO and IOM. However, females' mean drinking water intake was higher than the recommendations of EFSA, IOM, and WHO, respectively. The mean intake of all beverages for both males and females exceed the recommendations of EFSA, IOM, and WHO. It is for only 52% of all subjects (51% of males and 53 % of females) that intake of beverages alone exceeded fluid intake levels recommended by IOM, WHO, and EFSA, respectively. Therefore, it follows that 48% of the subjects need to obtain enough water from their foods to meet recommended fluid intake.

For all subjects, water was the most commonly consumed beverage. The overall contribution of Drinking Water Intake (DWI) to Total Beverage Intake (TBI) ranged from 60 to 78%. This range falls within the findings of a review (21) of water intake and other beverages by adults in 13 countries that contribution of water to TBI ranged from 47 to 78%. In Indonesia, the contribution is higher, being between 76 to 81% (2). The water sources indicated by the respondents showed a peculiar pattern in that bottled and sachet water provided the largest proportion of water intake. Tap water intake was minimal, being only 3.5 % of DWI by males and 6.5% by females. The low tap water intake reflects the poor municipal pipe-borne water supply availability in many Nigerian towns and cities neighbourhoods. Therefore, it is not surprising that many of the subjects rely greatly on bottles and sachet water.

In Nigeria, sachet water, also known colloquially as “Pure Water,” is water packaged, usually in a 500cc plastic/polythene pouch. It provides a more convenient and affordable source of drinking water than bottled water. The production and consumption of sachet water is a fairly recent development, but its popularity has grown immensely, especially in West Africa. Among male subjects in this study, more than 57% of total DWI was sachet water. That corresponds to over a third (37%) of TBI. The proportions were 58% of DWI and 42% of TBI for females. Stoler et al. (22) have concluded that sachet water consumption is associated with socioeconomic and knowledge factors in low-income countries like Ghana. Other studies (23,24) have also provided evidence that Municipal water rationing and low economic status tend to drive sachet water

consumption even at the metropolitan level. The results of this study appear to confirm that conclusion. consequences.

5.0 CONCLUSION

The study population surveyed in this work is not presented as representative of the Nigerian population but rather as a distinctive group within the wider population from whom some baseline data could be obtained for the country. Therefore, based on the results obtained, we conclude that the types of beverages consumed by our subjects are very similar to those reported for other communities in more developed countries of the world. Water, tea, and milk are the only three beverages consumed by all subjects. The largest contributions to TBI were water, tea, and alcoholic drinks. Sachet water was the main DWI source,

Table 1 Demographic Characteristics, Drinking Water Intake and Total Beverage Intake of Respondents

		N	%	DWI (ml)	TBI` (ml)	DWI %TBI
Location						
	Lagos	100	33.3	*2802.5±134.56	3910.89±15454	71.7
	Oyo	100	33.3	3264.7±150.13	4755.55±183.46	68.6
	Ogun	50	16.7	2477.1±241.02	3428.3±292.3	72.3
	Ondo	50	16.7	2894.5±163.50	4579.7±265.55	63.2
Sex						
	Males	134	44.7	2853.96±98.17	4392.23±155.96	70.0
	Females	166	55.3	2969.1±129.68	4087.26±146.45	72.6
Age						
	less than 25	15	5.0	2551.67±385.53	3771.6±430.77	67.7
	25-39 years	111	37.0	2778.11±116.01	4103.96±161.3	67.7
	40-49 years	104	34.7	3116.68±156.76	4331.99±192.21	72.0
	50 and above	70	23.3	2921.71±84.03	4348.61±235.76	67.2
Marital Status						
	Married	238	79.3	2914.37±88.57	4215.74±116.27	69.1
	Single	52	17.3	2632.79±171.34	3959.019±238.11	66.5
	Widow/Widower	5	1.7	4255±595.32	5767±884.56	73.8
	Divorced/Separated	5	1.7	5375	6623.75±2191.98	81.2
Grade level						
	Grade Level 1-6	50	16.7	3248.5±272.24	4504.6±292.77	72.1
	Grade Level 7-12	188	62.6	2820.67±102.68	4137.73±137.16	68.2
	Grade Level ≥12	62	20.7	2926.5±143.63	4215.33±203.58	69.4
Income (₦)						
	≤19,999	7	2.3	2317.86±450.02	3610.72±634.28	63.4
	20,000-29,999	24	8.0	2850±275.32	4278.75±373.75	69.3
	30,000-59,999	113	37.7	2746.73±149.07	4016.98±184.96	68.9
	60,000-99,999	116	38.7	3028.19±134.6	4281.29±170.42	71.3
	100,000-200,000	35	11.7	3261.43±198.9	4724.57±274.53	69.3
	≥ 200,000	5	1.7	2625±260.21	4056.67±643.54	68.8
Education						
	Primary	5	1.7	2895±795.16	4334.00±1177.23	65.7
	Secondary	35	11.7	2983.43±278.55	4400.09±361.87	67.0
	Diploma/Certificate	90	30.0	3118.78±179.83	4480.61±212.42	70.0
	Degree	170	56.6	2767.11±95.5	4004.47±128.29	70.3

DWI: Drinking water intake, TBI: Total beverage intake

Table 2: Median Intake and Percent Total Beverage Intakes of Male and Female Respondents

Beverage categories	Beverages (ml)	Males	%TBI	Females	%TBI	P-value
Drinking water	Total	2853.96±98.17	64.98	2969.1±129.68	72.64	0.003
	Sachet	1642.91±92.57	37.40	1733.68±89.23	42.42	0.917
	Bottle	652.8±76.65	14.86	548.16±70.55	13.41	0.723
	Tap	152.239±43.14	3.47	264.7±52.35	6.48	0.004
	Well	406.01±63.85	0.14	422.56±63.53	0.14	0.601

DWI: Drinking water intake, TBI: Total beverage intake

while beer and wine were the main sources of alcoholic drinks. Males consumed significantly more water, soda, alcoholic beverages, and herbal drinks than females. Overall, to meet the Internationally recommended water intake levels, 48% of our subjects will need to depend on water from foods.

Conflicts of Interests
The authors declare that they have no competing interests

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