

Original Research Article

Pattern and determinants of energy drink consumption among young persons in South-West Nigeria

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Received: 21 May 2026

Revised: 16 June 2026

Accepted: 03 July 2026

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ABSTRACT

Background: Energy drink (ED) consumption has become increasingly prevalent among young adults, particularly students, due to its perceived benefits in enhancing alertness and performance. These beverages are widely marketed and easily accessible, contributing to their growing popularity in both academic and social settings.

Methods: A descriptive cross-sectional study was conducted among 129 respondents using a structured, self-administered questionnaire. Data on sociodemographic characteristics, lifestyle factors, consumption patterns, and knowledge of health risks were collected. Statistical analyses, including chi-square tests and multivariable logistic regression, were performed at a 5% significance level to identify factors associated with regular consumption.

Results: The lifetime prevalence of ED consumption was high (86%), with 33.3% classified as regular users. Consumption was slightly higher among males and common across age groups. Taste (55.0%) and price (39.6%) were the main determinants of brand choice, with Fearless (49.6%) being the most consumed brand. Although 58.9% of respondents demonstrated high knowledge of health risks, unhealthy dietary habits (44.2%) and poor sleep patterns were prevalent. Significant predictors of regular consumption included unhealthy diet (AOR=3.25; 95% CI: 1.38-7.65) and consumption of certain brands, particularly monster (AOR=2.84; 95% CI: 1.12-7.25).

Conclusions: ED consumption is highly prevalent and influenced primarily by modifiable lifestyle factors. Targeted interventions focusing on dietary behavior, health education, and improved labeling practices are recommended to reduce habitual consumption and associated health risks.

Keywords: Energy drink consumption, Prevalence, Young adults, Lifestyle factors, Knowledge of health

INTRODUCTION

Energy drink (ED) consumption has risen markedly over the past two decades, particularly among adolescents and young adults, and now constitutes a significant component of non-alcoholic beverage intake worldwide. Initially developed to enhance athletic performance, EDs are increasingly consumed for perceived cognitive and physical benefits, including improved alertness,

concentration, and endurance. This shift has been driven by aggressive marketing strategies, widespread availability, and the alignment of these products with youth-oriented lifestyles that emphasize productivity, social engagement, and performance.^{1,2} However, EDs typically contain high concentrations of caffeine, sugar, and other stimulants such as taurine and guarana, raising concerns about their potential adverse health effects,

including cardiovascular disturbances, sleep disruption, and neuropsychiatric symptoms.³

The growing popularity of EDs represents an emerging public health concern, particularly in low- and middle-income countries where regulatory oversight may be limited. Global estimates suggest that a substantial proportion of young people consume s regularly, with prevalence rates ranging from 30% to over 70% depending on the population studied.^{1,4} In Nigeria, studies have similarly reported high levels of awareness and consumption among university students and young adults, reflecting increasing market penetration and cultural normalization of these beverages.^{5,6} The normalization of ED consumption is further reinforced by their affordability, accessibility, and targeted advertising, which often portrays these drinks as essential for coping with academic stress, fatigue, and demanding daily schedules.⁷

Beyond prevalence, there is increasing evidence that ED consumption is associated with a cluster of unhealthy lifestyle behaviors, including poor dietary habits, inadequate sleep, substance use, and low health risk awareness.^{8,9} Such clustering suggests that ED use may not be an isolated behavior but rather part of a broader pattern of modifiable risk factors contributing to long-term health outcomes. Despite these concerns, consumption persists even among individuals who are aware of potential adverse effects, indicating a complex interplay between knowledge, attitudes, environmental influences, and behavioral practices.

Although the body of literature on ED consumption is expanding, important gaps remain, particularly in the Nigerian context. Many existing studies have focused primarily on prevalence and awareness, with limited attention to detailed consumption patterns, brand preferences, contextual usage, and behavioral determinants such as dietary habits and label-reading practices. Furthermore, few studies have applied multivariable analytical approaches to identify independent predictors of regular consumption. Given the diversity of sociocultural and economic contexts within Nigeria, there is a need for more research that integrates these dimensions within a unified framework. This is critical for informing public health policy and intervention strategies. Evidence on the patterns and determinants of ED consumption can support the design of targeted health education campaigns, strengthen regulatory frameworks and promote healthier lifestyle behaviors among young people. This is especially important in the context of the rising burden of non-communicable diseases in sub-Saharan Africa, where modifiable behavioral risk factors play a significant role.

Therefore, this study aimed to assess the prevalence, patterns, and determinants of ED consumption among young people in Nigeria. Specifically, it sought to determine the extent of lifetime and regular use, examine consumption patterns across sociodemographic and

behavioral domains, and identify key factors associated with habitual consumption, with a view to informing evidence-based interventions and policy responses.

METHODS

Study design

Study employed descriptive cross-sectional design using an online survey to assess ED consumption among young persons in Southwest Nigeria. Data were collected using structured questionnaire administered through Google Forms and eligible participants voluntarily completed survey via web-based link distributed electronically.

Study setting and population

The study was conducted among young individuals residing in Southwest Nigeria. The target population comprised persons aged 18 to 30 years. This age group was selected due to its relatively high consumption of EDs and increased susceptibility to associated behavioral and health outcomes.

Study period

This study was carried out from June to December 2025.

Inclusion and exclusion criteria

Individuals were eligible to participate if they were aged between 18 and 30 years. Individual who was excluded from this study were those that not consent to the study.

Sampling technique

A convenience sampling technique was employed. Due to the online nature of the survey, participants were recruited via digital platforms, enabling voluntary participation among eligible individuals with access to the survey link. This approach facilitated rapid data collection across a geographically dispersed population.

Sample size determination

The sample size was determined using the standard formula for estimating a single population proportion:

$$n = Z^2 pq / d^2$$

Where: n=minimum sample size, Z=1.96 (standard normal deviate at 95% confidence level), p=prevalence of lifetime ED consumption of 91.2% from a previous study among young persons and d=margin of error (0.05). An allowance for 5% non-response was included.¹⁰

Sample size

The final achieved sample size for this study was 130.

Data collection instrument and procedure

Data were collected using a structured, self-administered questionnaire adapted from previously validated instruments assessing ED consumption among young adults, including those developed by Seifert et al and subsequently utilized in similar cross-sectional studies.⁴ The questionnaire consisted of several sections, including: sociodemographic characteristics, patterns of ED consumption, reasons for consumption, and awareness of potential health risks associated with ED use. The instrument was digitized using Google Forms to facilitate ease of distribution and data collection. The survey link was disseminated through social media platforms such as WhatsApp and email, as well as other online networks commonly used by young adults. Participation was voluntary, and informed consent was obtained electronically prior to access to the questionnaire. To ensure confidentiality and anonymity, no personally identifiable information was collected, and responses were securely stored with access restricted to the research team.

Variables definition

Dependent variable

The primary outcome variable in this study was ED consumption, which was operationalized in two ways. First, lifetime use of EDs was assessed as a descriptive variable and defined as a self-reported history of ever consuming an ED. Respondents were accordingly categorized as either ever users or never users. Second, regular use of EDs was defined and used as the main outcome variable for inferential analysis. Participants who reported consuming EDs more than once per month were classified as regular users, whereas those who consumed EDs once per month or less, or not at all, were classified as non-regular users.

Independent variables

Occupation was categorized into three groups: students (defined as individuals enrolled in a tertiary institution), employed, and unemployed. Awareness of risks associated with ED consumption was assessed as a binary variable (aware or not aware).

Knowledge of the side effects of EDs was assessed using a 12-item Likert scale, with response options ranging from strongly disagree to strongly agree, yielding a maximum obtainable score of 60.^{1,11} Individual scores were converted to percentages, and the mean score of the study population was used as the cutoff to categorize respondents into good knowledge (scores above the mean) and poor knowledge (scores equal to or below the mean).

Experience of side effects following ED consumption was determined by asking respondents to indicate any symptoms experienced from a predefined list. This variable was subsequently dichotomized into yes

(presence of at least one reported side effect) and no (no reported side effects).

Dietary pattern was assessed through self-rating using a 5-point Likert-type scale ranging from very unhealthy to very healthy. Responses were further dichotomized into unhealthy diet (very unhealthy, unhealthy, and not sure) and healthy diet (healthy and very healthy).

Physical activity was assessed based on the frequency of engagement in moderate-intensity activities, such as brisk walking for at least 30 minutes. Response options ranged from never to daily and were categorized into physically inactive (never, rarely, or once a week) and physically active (several times a week or daily).

Presence of underlying health conditions was determined based on self-reported past medical history. Respondents who reported any pre-existing condition were classified as having a health condition, while those who reported none were classified otherwise.

Data analysis

Data were entered, cleaned, and analyzed using the statistical package for the social sciences (SPSS) software (version 25). Data cleaning procedures included checks for completeness, consistency, and outliers prior to analysis. Descriptive statistics were used to summarize the study variables. Categorical variables were presented as frequencies and percentages, while appropriate summary statistics were used for continuous variables. The results were presented in tables and charts where appropriate. Bivariate analysis was conducted to assess the association between independent variables and regular ED use. The Chi-square test was used to test for associations between categorical variables, while Fisher's exact test was applied where the assumptions for the Chi-square test were not met. Variables that were statistically significant at the bivariate level ($p < 0.05$) were entered into a multivariable model using binary logistic regression to identify independent predictors of regular ED use. Adjusted odds ratios (AORs) with 95% confidence intervals were reported. Statistical significance was set at $p < 0.05$.

RESULTS

Table 1 revealed females constituted a slightly higher proportion (52.7%) than males (47.3%). Most respondents were young adults, as the majority were aged 20 years or below (43.4%) or between 21-25 years (42.6%), students formed the majority (89.1%), of the study respondents. Regarding lifestyle practices, a proportion of respondents engaged in physical activities regularly, with 34.9% exercising daily and 29.5% participating several times a week. More than half of the respondents (55.8%) rated their diet as healthy, although a substantial proportion (44.2%) still perceived their diet as unhealthy. Sleep duration showed that nearly half of the respondents (48.8%) slept between 4-6 hours daily, which may be

insufficient for optimal health. Furthermore, most respondents (84.5%) reported having no health condition, while anxiety disorder (7.0%) and hypertension (5.4%) were the most commonly reported health issues among those with medical conditions.

Pattern of lifetime use of EDs

The distribution of respondents based on their lifetime use of ED showed that 111 (86%) had ever consumed ED, while only 14% had never done so.

The pattern of ED consumption by age shows a high prevalence of use across both age categories. Among respondents aged ≤ 20 years, 83.9% reported ever consuming EDs, while 87.7% of those aged >20 years had ever consumed them. With regards to gender, males exhibited a higher prevalence of consumption (90.2%) compared to females (82.4%) (Figure 1).

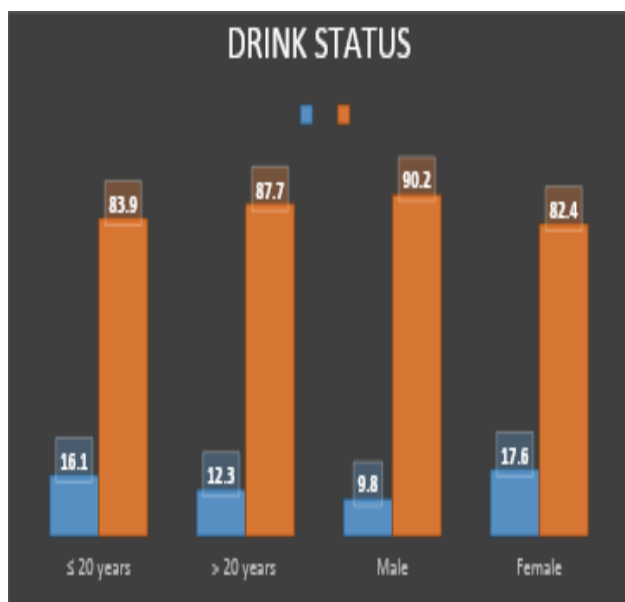


Figure 1: Pattern of lifetime ED use by age and gender, (n=129).

Types of brands consumed

As shown on Figure 2, the most commonly consumed ED among respondents was Fearless, reported by 49.6% of participants. This was followed by Predator (27.9%), Monster (26.4%), and Red Bull (19.4%) (Figure 2).

Characteristics of ED use among ever users

Among ever users of EDs, consumption patterns varied widely, with many respondents reporting no specific context for use (Table 2). Notably, over half of the participants (64, 57.7%) indicated that they consumed EDs without any particular occasion or reason. Among defined contexts, use during sports (28, 25.2%) and while handling stressful work (15, 13.5%) were the most commonly

reported, while fewer respondents used them for studying (12, 10.8%). Taste emerged as the most important factor influencing choice of ED brand, reported by 61 (55.0%) respondents, followed by price (44, 39.6%) and brand reputation (41, 36.9%). Fewer participants considered ingredients (19, 17.1%) or packaging (13, 11.7%) (Table 2).

Regarding side effects, the majority of respondents (72, 64.9%) reported no adverse effects following consumption. However, among those who experienced symptoms, headache (21, 18.9%) and increased heart rate (20, 18.0%) were the most commonly reported, followed by severe thirst (12, 10.8%). In terms of label reading, although 49 (44.1%) respondents reported sometimes reading nutritional information, a substantial proportion rarely (26, 23.4%) or never (23, 20.7%) checked labels (Table 2).

Level of knowledge of ED health risks

With regards to the recognition of potential health risks of ED, Table 3 shows that a large majority correctly identified that EDs can increase blood pressure and cause insomnia, with 100 (77.5%) respondents agreeing with each statement. Similarly, substantial proportions recognized anxiety (86, 66.7%), irritability (83, 64.3%), headaches (87, 67.4%), and gastrointestinal upset (84, 65.1%) as possible effects, while fewer associated ED consumption with obesity (59, 45.7%) or seizures (56, 43.4%) (Table 3).

The responses to the knowledge items were scored, and the mean score was used to dichotomise into high and low levels of knowledge. As shown in Figure 4, more than half (78, 58.9%) were classified as having an overall high level of knowledge (Figure 3).

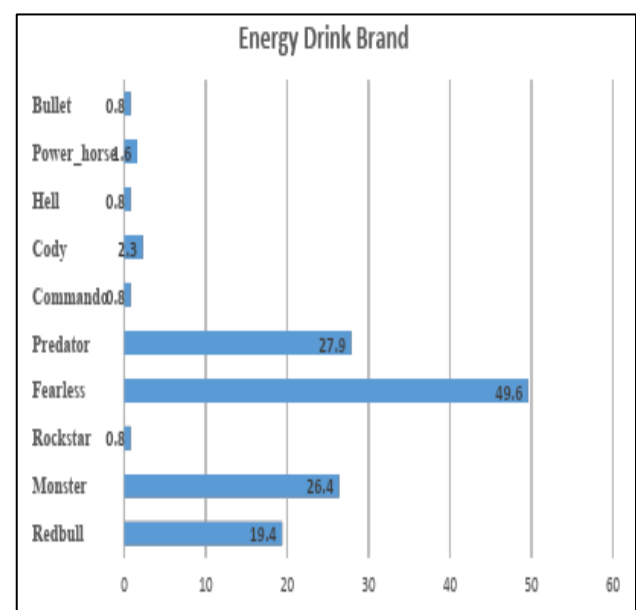


Figure 2: Types of ED brand consumed.

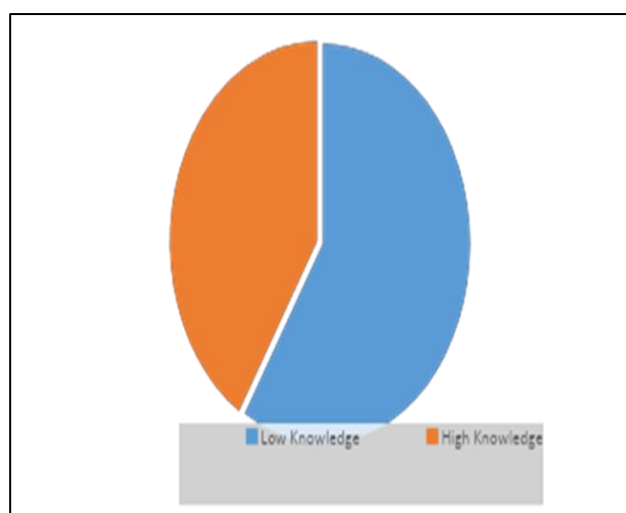


Figure 3: Distribution of levels of knowledge.

Prevalence of regular usage of ED

With regards to the regularity of ED consumption, those who consume ED more than once a month were classified as regular users, while those who do not meet that criteria or do not drink at all were classified as non-regular. As shown in Figure 5, 43 (33.3%) of the respondents indicated regular use (Figure 4).

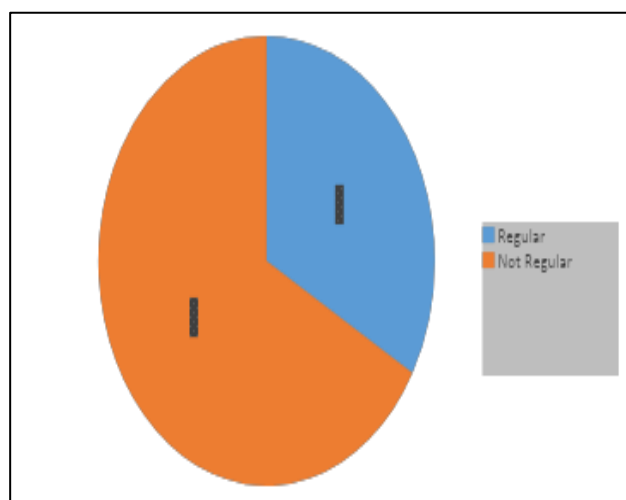


Figure 4: Prevalence of regular ED consumption.

Factors associated with regular ED consumption

The analysis showed that most sociodemographic and lifestyle variables were not significantly associated with regular ED consumption (Table 4). Although a higher proportion of respondents aged ≤ 20 years reported regular use (41.1%) compared to those older than 20 years (27.4%), this difference was not statistically significant ($\chi^2=2.666$, $p=0.102$). Similarly, regular consumption was comparable between males ($p=0.803$) and across occupational groups ($p=0.848$).

Lifestyle factors such as physical activity and sleep duration were also not significantly associated with regular ED use. For instance, 37.0% of physically inactive respondents reported regular use compared to 31.3% among those who were active ($\chi^2=0.422$, $p=0.516$). Likewise, a higher proportion of those sleeping less than 6 hours (26, 37.1%) reported regular use compared to those sleeping 6 hours or more (28.8%), though this was not statistically significant ($\chi^2=1.000$, $p=0.317$). Presence of a health condition was also not significantly associated with regular consumption ($p=0.390$).

However, diet and knowledge of side effects showed statistically significant associations with regular ED consumption. Respondents who reported an unhealthy diet were significantly more likely to consume EDs regularly (50.9%) compared to those with a healthy diet (19.4%) ($\chi^2=14.145$, $p<0.001$). In addition, those with poor knowledge of ED side effects had a higher prevalence of regular consumption (43.4%) compared to those with good knowledge (26.3%) ($\chi^2=4.099$, $p=0.043$).

The analysis of other ED consumption variables as shown on Table 5 revealed mixed associations with regular use. Experiencing side effects did not significantly influence regular consumption ($\chi^2=0.159$, $p=0.690$). However, label reading habits were significantly associated with regular consumption. Respondents who reported never or rarely reading product labels were more likely to consume EDs regularly (42.2%) compared to those who sometimes or always read labels (24.6%) ($\chi^2=4.481$, $p=0.034$). Brand-specific consumption also showed significant associations. Regular use was more prevalent among respondents who consumed Red Bull (52.0%) compared to non-consumers (28.8%) ($\chi^2=4.862$, $p=0.027$), and among those who consumed Monster (52.9%) versus non-consumers (26.3%) ($\chi^2=7.988$, $p=0.005$). In contrast, consumption of Predator and Fearless showed no significant association with regular use ($p>0.05$ for both) (Table 4).

Predictors of regular ED consumption

A multivariable logistic regression analysis was used to identify predictors of regular ED consumption while controlling for other variables. as shown in Table 6, dietary habits and consumption of 'Monster' were significantly associated with higher odds of regular ED use. Specifically, respondents with an unhealthy diet were more than three times as likely to consume EDs regularly compared to those with a healthy diet (AOR=3.25; 95% CI: 1.38-7.65; $p=0.007$). Similarly, participants who reported consuming 'Monster' were nearly three times more likely to be regular users compared to non-consumers (AOR=2.84; 95% CI: 1.12-7.25; $p=0.028$). Other variables, including low knowledge of side effects (AOR=1.63; $p=0.253$), never/rare label reading (AOR=2.22; $p=0.070$), and 'Red Bull consumption' (AOR=2.10; $p=0.173$), were associated with higher odds of regular use but did not reach statistical significance (Table 5).

Table 1: Sociodemographic and lifestyle characteristics of all participants.

Variables	N	Percentage (%)
Gender		
Male	61	47.3
Female	68	52.7
Age (in years)		
≤20	56	43.4
21-25	55	42.6
26-30	18	14
Occupation		
Student	115	89.1
Unemployed	2	3.1
Employed	10	7.8
Engagement in physical activities		
Never	2	1.6
Rarely	30	23.3
Once a week	14	10.9
Several times a week	38	29.5
Daily	45	34.9
Self-rating of overall diet		
Unhealthy	57	44.2
Healthy	72	55.8
Average hours of sleep per night		
Less than 4 hours	7	5.4
4-6 hours	63	48.8
6-8 hours	51	39.5
More than 8 hours	8	6.2
Self-reported health conditions**		
Heart condition	1	0.8
Anxiety disorder	9	7.0
Diabetes mellitus	2	1.6
Hypertension	7	5.4
Epilepsy	1	0.8
Peptic ulcer	2	1.6
None	109	84.5

** Multiple responses

Table 2: Characteristics of ED use among ever users, (n=111).

Variables	N	Percentage (%)
Occasions of ED use**		
During sports	28	25.2
Studying or before exams	12	10.8
Parties or special occasions	9	8.1
Sexual activities	3	2.7
When handling stressful work	15	13.5
No specific time or reason	64	57.7
Factors influencing choice of brand**		
Price	44	39.6
Taste	61	55.0
Brand reputation	41	36.9
Ingredients	19	17.1
Packaging	13	11.7
Celebrity endorsement/sponsorship	3	2.7
None of above	13	11.7

Continued.

Variables	N	Percentage (%)
Reported side effects after consumption**		
Jitters	11	9.9
Increased heart rate	20	18.0
Nausea	1	0.9
Headache	21	18.9
Anxiety	8	7.2
Severe thirst	12	10.8
No side effect experienced	72	64.9
Reading of nutritional information/labels		
Never	23	20.7
Rarely	26	23.4
Sometimes	49	44.1
Always	13	11.7

**Multiple responses

Table 3: Responses to knowledge items on potential risks of ED.

Variables	Agree, n (%)	Disagree, n (%)
ED consumption can cause irritability	83 (64.3)	46 (35.7)
EDs consumption can result in dental erosion	76 (58.9)	53 (41.1)
EDs consumption can cause an increase in blood pressure	100 (77.5)	29 (22.5)
Anxiety can be a side effect of EDs consumption	86 (66.7)	43 (33.3)
Insomnia can be a result of the consumption	100 (77.5)	29 (22.5)
EDs consumption can cause diarrhea	43 (33.3)	86 (66.7)
EDs consumption contributes largely to dehydration	74 (57.4)	55 (42.6)
EDs increases the risk of obesity	59 (45.7)	70 (54.3)
EDs consumption can cause risk of seizures	56 (43.4)	73 (56.6)
EDs consumption can result in more frequent passage of urine	87 (67.4)	42 (32.6)
EDs can cause gastrointestinal upset	84 (65.1)	45 (34.9)
Headaches can be a result of the consumption of EDs	87 (67.4)	42 (32.6)

Table 4: Association between sociodemographic / lifestyle variables and regularity of ED consumption.

Variables	Regular, n (%)	Not regular, n (%)	χ^2	P value
Age (in years)				
≤20	23 (41.1)	33 (58.9)	2.666	0.102
>20	20 (27.4)	53 (72.6)		
Gender				
Male	21 (34.4)	40 (65.6)	0.062	0.803
Female	22 (32.4)	46 (67.6)		
Occupation				
Student	38 (33.0)	77 (67.0)	0.329	0.848
Unemployed	1 (25.0)	3 (75.0)		
Employed	4 (40.0)	6 (60.0)		
Health condition(s)				
Yes	15 (75.0)	5 (25.0)	0.740	0.390
No	71 (65.1)	38 (34.9)		
Physical activity				
Inactive	17 (37.0)	29 (63.0)	0.422	0.516
Active	26 (31.3)	57 (68.7)		
Diet				
Unhealthy	29 (50.9)	28 (49.1)	14.145	<0.001*
Healthy	14 (19.4)	58 (80.6)		
Sleep duration				
<6 hours	26 (37.1)	44 (62.9)	1.000	0.317
>6 hours	17 (28.8)	42 (71.2)		

Continued.

Variables	Regular, n (%)	Not regular, n (%)	χ^2	P value
Knowledge of side effects				
Good knowledge	20 (26.3)	56 (73.7)	4.099	0.043*
Poor knowledge	23 (43.4)	30 (56.6)		

Table 5: Association between other ED consumption variables and regularity of ED use.

Variables	Regular, n (%)	Not regular, n (%)	X ²	P value
Experienced side effects				
No	30 (34.5)	57 (65.5)	0.159	0.690
Yes	13 (31.0)	29 (69.0)		
Label reading				
Never/rarely	27 (42.2)	37 (57.8)	4.481	0.034*
Sometimes/always	16 (24.6)	49 (75.4)		
Red bull consumption				
No	30 (28.8)	74 (71.2)	4.862	0.027*
Yes	13 (52.0)	12 (48.0)		
Monster consumption				
No	25 (26.3)	70 (73.7)	7.988	0.005*
Yes	18 (52.9)	16 (47.1)		
Predator consumption				
No	33 (35.5)	60 (64.5)	0.694	0.405
Yes	10 (27.8)	26 (72.2)		
Fearless consumption				
No	22 (33.8)	43 (66.2)	0.016	0.901
Yes	21 (32.8)	43 (67.2)		
Healthy	14 (19.4)	58 (80.6)		

*Statistically significant at $p < 0.05$.

Table 6: Multivariable logistic regression analysis of predictors of regular ED consumption, (n=129).

Variables	B	S. E.	AOR (Exp(B))	95% CI	P value
Knowledge of side effects					
High knowledge (Ref)	-	-	1.00	-	-
Low knowledge	0.491	0.430	1.63	0.70-3.80	0.253
Diet					
Healthy (Ref)	-	-	1.00	-	-
Unhealthy	1.180	0.436	3.25	1.38-7.65	0.007*
Label reading					
Sometimes/always (Ref)	-	-	1.00	-	-
Never/rarely	0.799	0.440	2.22	0.94-5.27	0.070
Red bull consumption					
No (Ref)	-	-	1.00	-	-
Yes	0.741	0.544	2.10	0.72-6.09	0.173
Monster consumption					
No (Ref)	-	-	1.00	-	-
Yes	1.045	0.477	2.84	1.12-7.25	0.028*
Constant	-2.381	0.464	0.092	-	<0.001

*AOR=Adjusted odds ratio, CI=Confidence interval, Ref=Reference category, *Statistically significant at $p < 0.05$.

DISCUSSION

ED consumption has emerged as a significant public health concern, particularly among adolescents and young adults, driven by rapid market expansion, aggressive marketing, and evolving lifestyle demands. This study assessed the prevalence, patterns, and determinants of ED consumption among young people in Nigeria.

Pattern of lifetime use

The results showed that a very high percentage, 86%, of the participants had tried EDs at least once. This shows that ED use is very common in this group, indicating that these drinks have become a regular part of people's daily routines. One possible reason for this high rate could be

the strong marketing efforts by ED companies, which often focus on young adults. These companies link their products to improved physical performance, better brain function, and a more active social life. Also, the fact that EDs are easy to get and inexpensive in cities and smaller towns probably makes them more popular. This matches the findings from in Kano, Nigeria, where they also found high levels of ED use among university students.⁵ However, our results are different from what has been found in other areas.¹² The difference might be of difference in population setting and the rules about selling these drinks in different areas can affect how often people drink them.

This study revealed that 83.9% of individuals aged 20 years or younger and 87.7% of those over 20 years reporting lifetime use. The relationship between age and ED consumption is complex, involving a transition from curiosity driven consumption, initially in early adolescence then to performance oriented habitual use in young adulthood. Furthermore, gender analysis reveals that 90.2% of males and 82.4% of females in the sample have engaged with these beverages. This is consistent with prior reports.¹³ However, some large surveys find only modest gender gaps or even slightly higher female lifetime use in certain contexts. For example, López-Arana reported slightly higher lifetime ED prevalence in Chilean female adolescents (72.8%) versus males (69.4%), though past-month use was higher in males (48.3% vs 43.9%).¹²

Characteristics of consumption among ever users

This study found that the most commonly consumed ED among respondents was “Fearless”, reported by 49.6% of participants, which was followed by “Predator” (27.9%), “Monster” (26.4%), and “Red Bull” (19.4%). This may be due to the increased availability of the more frequently consumed brands relative to others as well as cheaper prices of purchase. In a similar study carried out in a tertiary institution in South Eastern Nigeria, the brand “Fearless” also topped the different types of ED s consumed, at a percentage of 55.2%.⁶ However, another study carried out among undergraduate students in Kano placed “Power Horse” at the top of the rankings, with a consumption rate of 44.6%.⁵ One reason for this disparity in leading brands may be due to differing availability of and preference for certain ED brands depending on region, as well as affordability.

The study also highlights important behavioral and health-related patterns of ED consumption among ever users. A notable finding is that the majority of respondents (57.7%) consumed EDs without any specific occasion or reason, suggesting habitual or unstructured use. This pattern is consistent with evidence indicating that ED consumption is often embedded in routine lifestyle behaviors rather than tied to defined functional needs.⁴ A systematic review reported that EDs are frequently consumed for general stimulation or fatigue relief, rather than specific performance contexts.⁵ This habitual consumption raises

concerns about cumulative exposure to caffeine and other stimulants, especially when intake is not consciously regulated.

Among specific contexts, consumption during sports (25.2%) and stressful work (13.5%) were the most commonly reported. A 2023 systematic review found that EDs are commonly used to improve mental or physical performance, particularly among young and working populations.¹⁴ However, the relatively lower use for studying observed in this study contrasts with findings from student-focused populations, suggesting that contextual and occupational differences may influence consumption patterns.¹⁵

Taste (55.0%), price (39.6%), and brand reputation (36.9%) were the leading determinants of brand choice. These findings reinforce evidence that sensory appeal and affordability are dominant drivers of ED consumption, often outweighing health considerations.^{3,16} The relatively low importance placed on ingredients (17.1%) in this study suggests limited health-conscious decision-making, which may increase vulnerability to excessive intake of caffeine and other stimulants.

Although most respondents (64.9%) reported no adverse effects, a considerable proportion experienced symptoms such as headache (18.9%) and increased heart rate (18.0%). These findings are consistent with previous evidence demonstrating that ED consumption is associated with a range of neurological and cardiovascular effects.^{4,5} These effects are largely attributable to caffeine’s action as an adenosine receptor antagonist, leading to increased sympathetic activity and cardiovascular stimulation.⁵ The high proportion of respondents reporting no side effects in this study may reflect under-recognition of symptoms or adaptation to regular caffeine intake, rather than true absence of physiological effects.

Label-reading behavior was suboptimal, with only 11.7% of respondents always checking nutritional information, while a significant proportion rarely or never did so. This finding is concerning given the wide variability in caffeine content across EDs, which can range from moderate to very high levels. Poor engagement with product labeling has been identified as a key factor in unsafe consumption practices, particularly in settings where regulatory enforcement and consumer education may be limited.⁵

Knowledge of health risk associated with EDs

This study also assessed the level of knowledge regarding health risks associated with ED consumption. There was a high level of awareness for specific risks like increased blood pressure and insomnia and a notably lower recognition of risks such as obesity, seizures, and diarrhea. There was an overall high level of knowledge in just over half (58.9%) of the participants. These findings are consistent with a previous study by Xu et al which reported that sleep disturbances and increased heart rate or blood

pressure were the most commonly reported adverse effects.¹⁷ Similarly, a study by Tahir, found that increased heart rate, blood pressure and insomnia were the most known side effects.¹⁸ However, fewer than half of the respondents identified consumption of ED with obesity (45.7%), seizures (43.4%) and diarrhea (33.3%). A possible explanation for this result is that these risks are more long-term and indirect hence likely missed, also these effects are less publicized so there's little attention placed on them.

Despite the knowledge gaps in specific areas, more than half of the participants (58.9%) were classified as having an overall high level of knowledge. Similarly, a study by Tahir (2025) also found that 51% of participants had high awareness of the health risks of EDs, despite persistent consumption, indicating that awareness of some risks is present but may not translate into behavioural change.¹⁸ However, the fact that 41.1% still had low knowledge indicates a substantial public health information gap.

Pattern and factors associated with regular ED consumption

The study assessed the prevalence of regular ED usage and found that approximately one-third of the study population engaged in regular use, which was defined as usage of more than once a month. Evidence suggests that ED use among adolescents and young adults remains high, with pooled prevalence estimates of about 32% for recent (i.e., past 30-day) consumption, reinforcing the significance of the findings of this research.¹⁹ A possible explanation for the outcome is the increasing sociocultural normalization of ED consumption among young people, driven by marketing strategies, peer-pressure, and lifestyle demands.^{19,20} A factor which cannot be overlooked, in many African settings, is the reality of limited regulation and widespread advertising, which may deeply contribute to increased uptake, particularly among impressionable youth populations.^{20,21}

However, our findings are inconsistent with Trapp et al among Australian adolescents, suggesting varying prevalence rates depending on how "regular use" is defined and measured, with some reporting either higher or lower frequencies based on stricter criteria, that is, weekly or daily consumption.²² These discrepancies may be explained by several methodological and contextual differences. The identification of a high prevalence of regular use underscores the urgent need for targeted public health interventions, including awareness campaigns, regulation of marketing practices, and possible restrictions on sales to younger populations. Theoretically, the findings reinforce behavioural and ecological models of health, which posit that substance use behaviours are shaped by an interplay of individual, social, and environmental factors.

With respect to the factors associated with regular ED consumption most sociodemographic and lifestyle

variables were not significantly associated with habitual use, while modifiable behavioral and knowledge-related factors showed strong relationships. The lack of significant associations between age, gender, and occupation with regular ED consumption suggests that habitual use may cut across demographic subgroups in this population. Although younger respondents (≤ 20 years) showed a higher proportion of regular use, the difference was not statistically significant. This finding aligns with some previous literature indicating that while ED consumption is often more prevalent among younger populations, demographic predictors alone are insufficient to explain patterns of regular use, which are increasingly driven by behavioral and psychosocial factors.^{4,23}

Lifestyle variables such as physical activity and sleep duration were also not significantly associated with regular ED use in this study. Although respondents with shorter sleep duration (<6 hours) showed a higher proportion of regular consumption, this was not statistically significant. Previous studies have demonstrated associations between ED use and sleep disturbances; however, these relationships are often bidirectional and influenced by underlying behavioral patterns rather than direct causation.⁴ The lack of significant association in this study may reflect the complexity of these interactions or limited statistical power to detect subtle effects.

In contrast, diet emerged as a strong predictor of regular ED consumption. Respondents with unhealthy dietary habits were significantly more likely to consume EDs regularly. This finding is consistent with recent evidence that ED use clusters with other unhealthy lifestyle behaviors, including poor diet, high sugar intake, and low nutritional awareness.⁸ EDs themselves are often high in sugar and caffeine, and their regular consumption may reinforce or reflect broader unhealthy consumption patterns. This clustering of risk behaviors underscores the importance of considering ED use within the wider context of lifestyle and dietary practices.

Knowledge of side effects was another significant factor associated with regular consumption. Respondents with poor knowledge were more likely to consume EDs regularly, suggesting that awareness may play a role in moderating consumption behavior. It has been shown that individuals with greater knowledge of caffeine-related risks are less likely to engage in excessive or habitual ED use.²³ The finding highlights the importance of health education interventions aimed at improving awareness of potential adverse effects, including cardiovascular and neuropsychiatric symptoms.

Interestingly, experiencing side effects was not significantly associated with reduced regular consumption. This suggests that even when adverse symptoms occur, they may not be sufficient to deter continued use. Similar observations have been reported in literature, where users often normalize or underestimate side effects, particularly when perceived benefits such as increased energy or

alertness outweigh discomfort.²² This behavioral pattern may contribute to continued use despite potential health risks.

Label-reading behavior was significantly associated with regular ED consumption, with those who rarely or never read labels being more likely to consume EDs regularly. This finding is particularly important, as ED labels contain essential information regarding caffeine content and other stimulants. Poor label engagement has been linked to increased risk of excessive intake and adverse outcomes.⁸ The result suggests a gap in consumer awareness and highlights the need for clearer labeling and public health messaging to promote informed consumption.

Brand-specific associations were also observed, with consumption of certain brands being significantly associated with regular use. This may reflect differences in brand positioning, caffeine content, marketing strategies, and consumer loyalty. Strong branding and targeted marketing have been shown to influence consumption frequency and reinforce habitual use, particularly among young adults.²³ The absence of association with other brands suggests that not all products exert the same influence, possibly due to variations in perceived quality, accessibility, or marketing intensity.

Multivariable analysis identified unhealthy dietary habits and specific brand consumption as independent predictors of regular ED use. Individuals with unhealthy diets were over three times more likely to consume EDs regularly (AOR=3.25), consistent with evidence that ED use clusters with other poor lifestyle behaviors.⁸ Consumption of brands such as Monster also increased the likelihood of regular use (AOR=2.84), highlighting the influence of marketing and product appeal.²³ Although knowledge of side effects and label reading were not significant after adjustment, their trends remained relevant. Overall, ED consumption appears driven more by modifiable behavioral and environmental factors than by knowledge alone, supporting holistic public health interventions

Implications of findings

Overall, the findings of this study suggest that regular ED consumption is less influenced by fixed sociodemographic characteristics and more strongly driven by modifiable factors such as dietary habits, knowledge, and consumer behavior. The clustering of regular use with unhealthy diet and poor label-reading practices highlights important targets for intervention. Public health strategies should focus on improving awareness of health risks, promoting healthier dietary behaviors, and strengthening regulatory policies on the labeling and marketing of EDs.

Strength and limitations

The study addresses a critical public health gap in low- and middle-income countries such as Nigeria by providing a detailed evaluation of ED consumption that goes beyond

basic prevalence to examine complex behavioral determinants, brand preferences, and label-reading habits. A major limitation of the study is its small sample size of only 129 respondents, which restricts the generalizability of the findings to the wider population of young adults in Southwest Nigeria. Additionally, the reliance on convenience sampling via digital platforms introduces selection bias, as it restricts participation to literate individuals with active internet access and a presence on specific social media networks.

CONCLUSION

This study demonstrates that ED consumption is highly prevalent among young adults, with a substantial proportion engaging in regular use. Although awareness of potential health risks is relatively high, this knowledge does not consistently translate into healthier consumption behaviors. Instead, modifiable lifestyle factors, particularly unhealthy dietary habits, emerged as the strongest predictors of regular intake, alongside brand-related influences. Sociodemographic characteristics showed limited association with consumption patterns, which suggest the greater role of behavioral and environmental determinants.

The findings highlight a concerning pattern of habitual and, in many cases, unregulated consumption, often occurring without a specific purpose and with minimal attention to product labeling. Given the associated adverse effects and potential long-term health implications, there is a clear need for targeted interventions. Efforts should prioritize promoting healthier dietary practices, strengthening risk communication, and encouraging informed consumer behavior through improved label engagement. Additionally, regulatory measures addressing marketing practices and product accessibility may be necessary to curb excessive consumption. Overall, a multifaceted public health approach is essential to mitigate the growing impact of ED use among young populations.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Olosunde OA, Olajubu TO, Ajayi MJA, Oshinowo IO, Ofodile JK, Nweneka TC, et al. Pattern and determinants of energy drink consumption among young persons in South-West Nigeria. *Int J Res Med Sci* 2026;14:3148-59.