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Research article

Prevalence And Determinants of Disordered Eating Behaviours and Feeding and Eating Disorders among Schooling Adolescents in Ibadan, Southwest Nigeria

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ABSTRACT

Feeding and Eating disorders (FEDs) are the third commonest chronic condition in adolescents, after obesity and asthma, and are often preceded by disordered eating behaviours (DEBs) which are abnormal eating patterns that predispose to FEDs. They constitute public health importance as a result of significant association with decreased quality of life, and substantial medical and psychiatric complications among adolescents. The prevalence of DEBs and FEDs has been on the increase in the western world following the onset of the pandemic with varying reports in developing countries. Therefore, this study was carried out to determine the prevalence of DEBs and FEDs, the associated sociodemographic correlates, determinants and their relationship with nutritional status. In a descriptive cross-sectional study design, 411 schooling adolescents aged 13 to 19 years were selected using a multistage random sampling technique and a pre-tested self-administered questionnaire was used to collect data on socio-demographic characteristics and other determinants. The SCOFF screening tool and DSM V diagnostic tool were used to identify those with DEBs and FEDs respectively. Participants' weight and height were measured, their nutritional status classified using the WHO z-score. All data were analyzed using the IBM Statistical Package for Social Science version 20.0. The participants comprised 180 males (43.79%) and 231 females (56.21%) with a male to female ratio of 1:1.28. Our data showed that more than one (28.22%) out of every four participants has DEBs, and more than half (61.4%) of all the participants have one sub-type of FEDs or the other. The presence of chronic illness (OR=4.43), the effect of peer pressure on eating habits (OR=2.16), parental concern about body image (OR=2.12) and recent major life events (1.79) were independently associated with both DEB and FEDs, and there is a statistically significant association between FEDs and nutritional status but not with DEBs. We concluded that DEBs and FEDs are common among schooling adolescents in IBNLGA. Thus, there is a need for increased public awareness and deliberate efforts at prevention and early identification through routine screening in secondary schools. Special attention must also be given to the eating habits of adolescents with chronic illnesses.

Keywords: *Feeding and eating disorders, disordered eating behaviours, associated factors, SCOFF, DSM V*

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INTRODUCTION

Feeding and Eating disorders (FEDs) are persistent disturbances of eating behaviour or attitude intended to control weight that significantly impair an individual's physical health and psychosocial functioning. (Fairburn and Walsh, 2002) They are often preceded by disordered eating behaviours (DEBs) which are sub-threshold states of FEDs and recognized harbingers of FEDs. They are characterized by persistent disruption of eating-related behaviours that results in an altered consumption or absorption of food with significant impairment of health. (Fairburn and Walsh, 2002; NEDC, 2016) These disorders often emerge in the

adolescence age, between 10 and 20 years, especially in the mid and late adolescence, making their recognition in high schools of utmost importance. (Rindahl, 2017) This is because adolescence is a developmental period of considerable self-awareness and critical self-evaluation characterized by body dissatisfaction and subsequent attempts to remedy this by dieting and other various activities that predispose to FEDs.(Volpe *et al*., 2016; Burt *et al*., 2020) FEDs are important public health conditions with significant association with decreased quality of life, substantial medical complications, increased risk of depression, substance abuse and suicide among adolescents.(Kirkcaldy *et al*., 2007; Qian *et al*., 2013) Their complications also include several associated psychologic, psychiatric and personality changes such as feelings of inadequacy, low self-esteem, moodiness, apprehension, anxiety and other compensatory actions. (Izevbigie and Owie, 2006; Nicholls, 2016). They often cause disturbance in almost every organ system as a result of associated severe malnutrition (Kreipe, 2011; Demmler, 2019) They are described as one of the most common psychiatric disorders among adolescent girls and young women. (Kreipe and Birndorf, 2000) A death rate of up to 10% has been reported from anorexia nervosa resulting from severe electrolyte disturbance, arrhythmia, and heart failure, especially in the recovery phase. (Litt, 2005) They are the third commonest chronic condition in adolescents, with up to a five per cent prevalence rate in any given population (Fisher *et al*., 1995; Wood and Knight, 2019) (Demmler, 2019)

The global prevalence of FEDs has been on the increase in the past two decades as a result of increasing awareness, rising westernization, cultural shifts and a rise in the perception of ideal body size and shape, especially among adolescents. (Hoek, 2016) Many clinicians are conversant with the two most prominent FEDs (anorexia nervosa and bulimia nervosa), but increasing recognition is being given to the other categories such as binge eating disorder, rumination, and pica in recent times. (Nicholls, 2016) The rising prevalence of these previously rare categories led to the review of the DSM-IV classification of FEDs and gave birth to the DSM-V classification (Kreipe, 2011; Lindvall Dahlgren and Wisting, 2016; Walsh, 2018)

While these conditions can foist a considerable burden of morbidity and mortality, awkwardly, their diagnosis is often elusive and missed, as more than half of all cases of FEDs go undetected, untreated, and do not recover fully when treated, thereby leading to a long-lasting effect on the total health of adolescents that eventually linger into adulthood (Becker *et al*., 1999; Campbell and Peebles, 2014).

There is substantial evidence in the literature that there is a rising prevalence of FEDs in many developed countries, and also in some developing countries like Nigeria among adolescents following the onset of the pandemic that brought about a significant change in our lifestyle. (Alfalahi *et al*., 2021) Many of these adolescents usually present at a stage when medical and psychiatric complications have become obvious, and now require hospital admissions for optimal treatment. This is because they are not identified or screened for at the early phase of disordered eating patterns before they could even meet the criteria for FEDs.(NEDC, 2016) This early stage is the period of disordered eating behaviours (DEBs), attitudes or patterns which is a range of irregular eating behaviours that may or may not warrant a diagnosis of a specific eating disorder but often precede FEDs diagnosis. (Anderson, 2018) Thus, it is imperious for clinicians and public health experts to have a high index of suspicion for early pointers to DEBs and for adolescents in secondary school to undergo routine screening for these DEBs to aid early identification and prevent progression into FEDs. (Campbell and Peebles, 2014; Sacco and Kelley, 2018)

DEBs and FEDs among schooling adolescents have been widely reported and studied in many developed countries of the world in the last four decades, but not so in sub-Saharan Africa. While there are pockets of case reports on FEDs among schooling adolescents in Nigeria, studies on their prevalence and population-based statistics are still very scarce in literature especially following the last DSM review and after the onset of the pandemic.(Famuyiwa, 1988; Unuhu *et al*., 2009; Ehimigbai *et al*., 2017). In 2014, Pike *et al*.(Pike *et al*., 2014) found that eating disorders in Arab and Asian countries tend to be growing in tandem with growing urbanization, industrialisation, and globalization. A similar trend has been documented among African adolescents as reported by Rauof *et al*(Rauof *et al*., 2015) in Iran in the year 2014 and by Dike *et al*(Dike, 2009) in Nigeria in 2009. Dike *et al* (Dike, 2009)reported that about 58% of the studied female adolescent population had a predisposition for anorexia nervosa and bulimia nervosa. (Dike, 2009). The increasing prevalence of DEBs was also documented by Oyewumi *et al*(Oyewumi and Kazarian, 1992) and Fadipe *et al*(Fadipe B *et al*., 2017) in their respective work among Nigerian undergraduates and college students in the years 1992 and 2017 respectively. Most of the documented prevalence in Nigeria is among adult females, undergraduates and college students with very few among schooling adolescents.

Considering the magnitude of the problem on the adolescents' quality of life, and the medical complications associated with them, this study was conducted to evaluate the prevalence of DEBs and FEDs among Nigerian adolescents to present evidence-based proof for the need for increased awareness among health care workers, parents and care-givers and possible need for routine screening as part of school health programme. Having this information will be helpful in planning and directing health education at their prevention and ensuring early diagnosis among the at-risk groups.(Golden *et al*., 2016)

In the same vein, several socioeconomic factors and determinants have been documented in many developed countries which include: being part of dysfunctional homes, parenting style, low self-esteem, peer pressure, dieting, parental preoccupancy with weight, obesity and so on.(Patton *et al*., 1999; Dike, 2009; Hautala *et al*., 2011) Investigating the factors and their association with DEB and FEDs among the Nigerian schooling population will be beneficial in tailoring preventive and therapeutic modalities aright.(Hautala *et al*., 2011; Portela de Santana *et al*., 2012a) Some studies have also documented significant correlation between eating disorders and malnutrition (under-nutrition or obesity); either as playing a fundamental, causal, or resultant role, and serving as an important co-morbidity among others.(Sim *et al*., 2013;

Golden *et al*., 2016) Musaiger *et al* (Musaiger *et al*., 2013) reported that the risk of DEB is two to three times greater in obese adolescents than in non-obese adolescents in five Arab countries in 2013. Other published work has also highlighted that more than half of adolescents with AN have BMI less than 2 standard deviations for age and sex and are thus considered underweight according to the WHO growth chart. It is therefore expedient to explore whether these assertions on other associated factors and malnutrition (underweight, overweight and obesity) are also true among Nigerian adolescents.

MATERIALS AND METHODS

Study Design: The study was descriptive cross-sectional in design. It involved the collection of data from adolescents aged 13 to 19 years in secondary schools.

Study Area and Settings: The study was carried out in selected secondary schools in Ibadan North Local Government Area (IBNLGA), Oyo State, Nigeria between September 2020 and February 2021.
This study focused on adolescents aged 13 to 19 years in public and private secondary schools in IBNLGA. The choice of the study population for the study is based on the ease of getting healthy schooling adolescents to participate in the research.

Participants, Sample size eligibility: The sample size formula for estimation of proportion/prevalence (Leslie Kish formula) was used to calculate the minimum sample size for this study based on an assumption that a prevalence of 58% for abnormal eating attitudes as reported by **Dike** *et al* (Dike, 2009)in a similar study in Ogun state and it was calculated. The estimated required minimum sample size for this study is 374 participants. However, to allow for a 10% non-response rate the calculated sample size was adjusted to 411 participants.

Only adolescents aged 13 to 19 years and attending secondary school in Ibadan North Local Government Area in southwest Nigeria were allowed to participate in this study.

Sampling Technique: A multistage stratified random sampling method was adopted for this study. 8 wards were randomly selected from the 12 wards in the local government by balloting. Two schools (one private and one public) were randomly selected by balloting from all the schools in each ward, giving rise to a total of 16 schools. A sampling frame of all the eligible students in each of the selected schools was developed. The number of adolescents recruited from each school was worked out based on the ratio of the number in a school to the total number of adolescents in all the selected schools as shown below.

$$number\ per\ school = \frac{number\ of\ students\ in\ a\ school}{total\ number\ of\ in\ all\ the\ 24\ school}\ X\ Sample\ size$$

In each school, eligible students were stratified by age (13 to 19 years) and gender (male and female). The calculated sample size was shared among the 7 categories of ages (13-19 years). In each stratum, participants were randomly selected from the school register by systematic random sampling in which every nth (3rd) student who assented, and whose parents consented to participate in the study is selected.

Data Collection Methods and Measurements: The study proforma was then administered by the investigator and a trained research assistant to the selected eligible participants who assented to participate. The information collected included: date of birth, age, gender, educational attainment of parents, occupation of parents, family setting, family size and other personal and parental information. The socio-economic index scores were assigned to each subject based on the occupation and educational achievement of the parents as described by Oyedeji *et al*(Oyedeji, 1985). The SCOFF questionnaire was used to identify those with DEBs. The SCOFF questionnaire is a very sensitive, and easy to use screening tool for DEBs that can be administered at primary health care, and school health centers, by low cadre health workers (Morgan *et al.*, 1999) It was developed in the UK and subsequently validated through standardized scientific methods. It consists of five questions in which are embedded the core features of AN and BN shortened into an acronym, SCOFF which implies sick, control, one, fat and food making it the shortest and simplest screening tool in literature. with a 100% sensitivity for AN and BN and a specificity of 87.5%. (Morgan *et al.*, 1999) (Sim *et al.*, 2010) 1 point is allocated for the presence of each question and anyone that score 2 or more is considered to have DEBs; has either AN or BN or is at a high risk of FEDs. The modified DSM V FEDs tool was used to classify the FEDs present. The proforma was self-administered with necessary guidance by the investigator when the students were in doubt.

Anthropometric measurements, including weight and height, were measured using the WHO growth assessment procedures. The BMI of each study participant was calculated using the formula below and classified based on the WHO BMI for age and sex z-score.

$$BMI\ (kg/m^2) = \frac{weight\ (kg)}{height\ (m)\ x\ height\ (m)}$$

Data analysis: All data were entered into the IBM Statistical Package for Social Scientists (SPSS for Windows) version 20.0 and analyzed using the same. (Chicago, IL, USA). (IBM SPSS, 2011) The characteristics of the participants, including age, sex, and socioeconomic status were summarized using descriptive statistics. The distributions of categorical variables between two or more subgroups were compared using Pearson's Chi-square tests. Logistic regression analysis was used to determine the association between DEBs and/or FEDs, socioeconomic status identified associated factors and other identified comorbidities. Variables that demonstrate a significant association with DEBs and/or FEDs in univariate analysis were included in a multivariate logistic regression analysis to adjust for confounding effects. For all analyses, a value of $p < 0.05$ was considered statistically significant.

Ethical consideration: The study protocol was reviewed by the Oyo State Ministry of Health Ethical Review Committee and ethical approval was obtained**.** Permission to conduct the study was obtained from the Ministry of Education. School proprietors were also visited to obtain permission as well. Written and/or verbal informed consent was obtained from the parents or caregivers, and assent was obtained from all the participants before the questionnaires are administered and measurements were taken.

RESULTS

Table 1 shows the participants' socio-demographic characteristics including the prevalence of DEBs and FEDs and their distribution according to nutritional status across both private and public schools. There were 411 participants, with almost equal distribution from public and private schools, but more females (56.21%) than males.

Table 1:
Participant's characteristics of 411 schooling adolescents in IBNLGAs.

Characteristics		All participants		Public Schools	Private Schools	P
		N	(%)	N	N	
Age	*13-15*	290	(70.6)	114	176	69.297(<**0.001**)
	16-19	121	(29.4)	102	19	
Sex	*Male*	180	(43.8)	101	79	1.624(0.202)
	Female	231	(56.2)	115	116	
Tribe	*Yoruba*	345	(88.5)	183	162	10.103(**0.018**)
	Hausa	22	(5.7)	15	7	
	Ibo	12	(3.1)	8	4	
	Others	11	(2.8)	5	6	
Religion	*Christianity*	260	(65.5)	116	144	20.754(<**0.001**)
	Islam	134	(33.8)	90	44	
	Traditional	2	(0.5)	2	0	
	Others	1	(0.3)	1	0	
Parents' socioeconomic status	*1*	173	(42.1)	31	142	147.706**(<0.001)**
	2	80	(19.5)	51	29	
	3	76	(18.5)	68	8	
	4	26	(6.3)	25	1	
	5	1	(0.2)	1	0	
Mother's marital status	*Married*	352	(85.6)	169	183	20.201**(<0.001)**
	Single	15	(3.7)	11	4	
	Separated/divorced	26	(6.3)	22	4	
	Widowed	18	(4.4)	7	1	
Disordered Eating Behaviour	*Yes*	116	(28.2)	64	47	3.111 (0.078)
	No	295	(71.8)	147	148	
Feeding and Eating Disorder	*Yes*	246	(61.6)	134	112	0.305 (0.607)
	No	153	(38.3)	79	74	
Nutritional Status	*Thinness*	56	(13.6)	42	14	20.754 (<**0.001**)
	Normal weight	292	(71.5)	164	128	
	Overweight	38	(9.25)	9	29	
	Obesity	25	(6.08)	1	24	

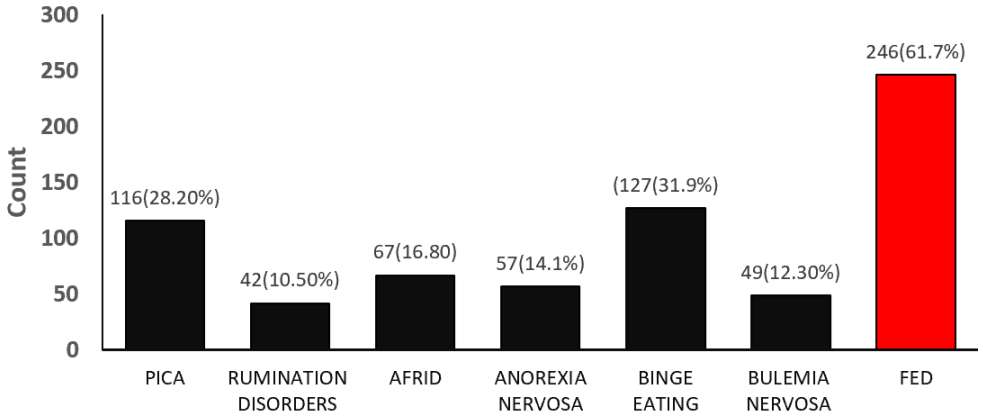

Figure 1:
Prevalence of feeding and eating disorders (FEDs) among 411 schooling adolescents in IBNLGA using DSM V Tool.

Table 2:
Association between Socio-demographic, personal and parental factors and DEBs among 411 schooling adolescents in IBNLGAs.

	Variable	Disordered Eating Behaviours		Chi-Square(P-value)
		Yes (%)	No (%)	
Age	*Mid Adolescents*	72 (24.83)	218 (75.17)	5.609**(0.018)**
	Late Adolescents	44 (36.36)	77 (63.64)	
Type of School	*Public*	69 (31.94)	147 (68.06)	3.11(0.078)
	Private	47 (24.10)	148 (75.89)	
Gender	*Male*	54 (30.00)	126(70.00)	0.499 (0.480)
	Female	62 (26.84)	169 (73.16)	
Tribe	*Yoruba*	93 (27.84)	252 (72.81)	4.014 (0.260)
	Hausa	8 (36.36)	14 (63.64)	
	Igbo	6 (50.00)	6(50.00)	
	Others	5 (23.81)	16 (76.19)	
Religion	*Christianity*	61 (23.46)	199 (76.54)	9.676**(0.028)**
	Islam	47 (35.08)	87 (64.93)	
	Traditional worship	1 (50.00)	1 (50.00)	
	Others	1 (100)	0 (0.00)	
Social Class	*1*	41 (23.70)	132(76.30)	6.824 (0.145)
	2	21 (26.25)	59 (73.75)	
	3	20 (3.47)	556 (96.53)	
	4	11 (42.31)	15 (71.43)	
	5	1 (100)	0 (0.00)	
Mother's Marital Status	*Married*	93 (26.42)	259(73.58)	10.555**(0.032)**
	Single	8 (53.33)	7(46.67)	
	Divorced/ Separated	9 (34.61)	17 (65.39)	
Parents living together	*Yes*	95 (27.14)	255 (72.86)	1.967 (0.109)
	No	19 (36.54)	33 (63.46)	
Effect of chronic illness	*Yes*	39 (49.37)	40 (50.63)	21.198 **(<0.001)**
	No	75 (23.29)	247 (76.71)	
Effect of peer pressure on ED	*Yes*	36 (59.02)	25 (40.98)	33.042 **(<0.001)**
	No	77 (22.92)	259 (77.08)	
Effect of peer pressure on the perception of body image	*Yes*	48 (45.28)	58 (54.72)	19.543 **(<0.001)**
	No	65 (22.57)	223 (77.43)	
Parental concern about body image and weight	*Yes*	60 (41.96)	83 (58.04)	17.056 **(<0.001)**
	No	54 (22.13)	190 (77.87)	
Experienced Bullying	*Yes*	53 (33.97)	103 (66.86)	5.346 **(0.021)**
	No	54 (23.28)	178 (76.72)	
Major life change	*Yes*	78 (37.14)	132 (62.86)	17.949 **(<0.000)**
	No	32 (17.78)	148 (82.22)	
Smoking	***Yes***	11 (68.75)	5 (31.25)	13.240 **(<0.001)**
	No	105 (26.85)	286 (73.15)	
Drink alcohol	*Yes*	10 (38.46)	16 (61.54)	1.290 (0.256)
	No	106 (28.04)	272 (71.96)	
Food availability in the house	more than sufficient	52 (32.91)	106 (67.09)	8.642 **(0.034)**
	just sufficient	51 (27.13)	137 (72.87)	
	barely sufficient	4 (15.38)	22 (84.62)	
	Insufficient	7 (58.33)	5 (41.67)	
Extracurricular activities	***Yes***	96 (29.00)	235 (70.99)	3.924 (0.141)
	No	14 (22.95)	47 (77.05)	

There are more participants from the mid-adolescents than from the late adolescents' age group as shown in Table 1. More than half are from the high socioeconomic class with the majority (85.64%) from parents who are married. The prevalence of DEBs using the SCOFF tool from this study is 28.2% with a little more from public schools (55.17) than private, though the difference is not statistically significant. Similarly, more than half (61.7%) of the respondent has one FEDs with varying prevalence for each subtype of FEDs as shown in Figure 1.

Table 2 showed that participants' age, religion, mother's marital status, presence of a chronic illness, the effect of peer pressure on eating habits, parental concern about body image, bullying, peer's perception of body image, smoking, major life change, and availability of food were significantly associated with DEBs ($p < 0.05$, respectively). However, following

multivariate and adjusted logistic regression, (shown in Table 3) it was observed that the presence of chronic illness (OR=2.14), the effect of peer pressure on eating habits (OR=3.91), parental concern about body image (OR=1.93) and presence of major life events (OR=2.5) were independently associated with the DEB.

Association between sociodemographic factors, personal and parental factors and FEDs in general: Table 4 showed that the presence of a chronic illness, the effect of peer pressure on eating habits, bullying, parental concern on body image, peer's perception of body image, and major life change are significantly associated with the presence of one FEDs or the other using the DSM V criteria while it was observed that presence of chronic illness(OR=4.43), the effect of peer pressure on eating habits(OR=2.16)., parental concern about body image(OR=2.12), and presence of major life events (OR=1.79); were independently associated with the FEDs as shown in table 5.

Association between DEB and Nutritional status, and between FEDs and Nutritional status among 411 schooling adolescents in IBNLGA: This study shows that there is no statistically significant association between disordered eating behaviours and nutritional status but there is a statistically significant association between FEDs identified using DSM V and nutritional status and as shown in Table 6

DISCUSSION

FEDs are persistent disturbances of eating behaviour that results in psychosocial dysfunction. (Walsh, 2018) They are often heralded by disordered eating behaviours (DEB) or attitudes which are important precursor of FEDs but also has attendant medical and psychosocial complications. (Campbell and Peebles, 2014; Anderson, 2018)

Our data has shown that DEBs are very common among adolescents in this population, and their prevalence in this study (28.22%) is comparable to what has been documented by Alfalahia *et al*(Alfalahi *et al*., 2021), Szabo *et al*(Szabo and Allwood, 2004a), and others. A pooled prevalence of 22.28% among 3601 adolescents screened using the same tool was reported from a systematic review and meta-analysis involving 27 studies was reported by Alfalahi *et al* (Alfalahi *et al*., 2021) which is comparable to this study despite varying sample sizes. This is also very close to a prevalence of 22.07% found when the Eating Attitudes Scale 26 and the Eating Attitudes Scale 40 were used for screening. (Alfalahi *et al*., 2021) A similarly high prevalence has been documented in South Africa by Szabo *et al* (Szabo and Allwood, 2004b) using another screening tool in 2004 when they documented a prevalence of 20.7% and 37.5% for white and black adolescent participants respectively. (Szabo and Allwood, 2004b).

When compared with earlier studies in Nigeria which employed other screening tools for DEBs, a lower prevalence of 14.1% was documented by Oyewumi *et al* in 1992 among 644 Nigerian female college and undergraduate students using the EAT-26 questionnaire which is similar to a report of 14.3% among adolescents in Benin city reported by Ehimigbai *et al*(Ehimigbai *et al*., 2017b) in 2009. It is however difficult to compare their findings with the findings in this study because their study was done about three decades ago, they included undergraduate students not adolescents and different tools were applied for screening. (Oyewumi and Kazarian, 1992) However, Dike *et al*(Dike, 2009) reported a higher prevalence of 58% among adolescent and early adult females in Ogun state Nigeria using the EAT-26 questionnaire 2009. Their study was exclusively among females and could therefore be the reason for the high prevalence as DEBs and FEDs are known to be commoner among female gender in most reports.

Table 3:
Univariate and adjusted logistic regression for factors associated with DEB

		Unadjusted OR			**Adjusted OR**		
		OR	95% CI	P	OR	95% CI	P
Age-categories	Mid-adolescents*	1	-		1		
	Late-adolescents	1.73	1.10, 2 .73	0.019	1.34	0.72, 2.50	0.357
Religion	*Christianity**	1	-		1		
	Islam and Others	1.82	1.16, 2.86	0.010	1.41	0.77, 2.58	0.265
Mother's marital status	Married*	1	-		1	-	
	Single/separated/others	2.09	1.13, 3.86	0.019	1.348	0.59, 3.08	0.478
Effect of chronic illness	*Yes*	3.21	1.93, 5.35	0.000	2.142	1.06, 4.34	**0.034**
	No	1	-		1	-	
Peer pressure effect on ED	Yes	4.84	2.74, 8.57	0.000	3.91	1.72, 8.90	**0.001**
Perception of body image	Yes	2.84	1.77, 4.55	0.000	1.31	0.66, 2.60	0.442
	No	1			1		
Parental concern	Yes	2.54	1.62, 3.98	0.000	1.931	1.08, 3.44	**0.026**
	No				1	-	
Bullying	Yes	1.70	1.10, 2.66	0.021	0.842	0.466, 1.52	0.571
	No				1	-	
Smoking	*Yes*	5.99	2.03, 17.66	0.001	1.68	0.39, 7.30	0.490
	No	1	-		1	-	
Major life change	*Yes*	2.73	1.70, 4.39	0.000	2.512	1.37, 4.60	**0.003**
	No	1	-		1	-	
Food availability	More than sufficient	0.759	0.48, 1.21	0.047	0.759	.478, 1205	0.242
	Insufficient	1		0.000			

Table 4:
Association between Socio-demographic, personal and parental factors and FEDs among 411 schooling adolescents in IBNLGAs.

Variable		Feeding and Eating Disorders (FEDs)		Chi-Square (P-value)
		No (%)	**Yes (%)**	
Age	*Mid Adolescents*	111 (29.36)	171 (60.64)	0.420 (0.517)
	Late Adolescents	42 (35.90)	75 (64.10)	
Type of School	*Public*	79 (37.09)	134 (62.91)	0.305 (0.581)
	Private	74 (39.78)	112 (60.22)	
Gender	*Male*	64 (26.16)	113 (63.84)	0.644 (0.422)
	Female	89 (40.09)	133 (59.91)	
Tribe	*Yoruba*	136(40.48)	200 (59.52)	3.990(0.263)
	Hausa	9(40.91)	13(59.09)	
	Igbo	2(18.18)	9(81.82)	
	Others	5 (25.00)	15 (75.00)	
Religion	*Christianity*	102 (40.91)	150 (59.09)	1.894(0.595)
	Islam	48 (36.36)	84 (63.64)	
	Traditional worship	0 (0)	2 (100)	
Social Class	*1*	68 (40.48)	100 (59.52)	1.162 (0.762)
	2	33 (42.31)	45 (57.69)	
	3	29 (38.67)	46 (61.33)	
	4	8 (30.77)	18 (69.23)	
	5	68 (40.48)	100 (59.52)	
Mother's Marital Status	*Married*	139 (40.64)	203 (59.36)	6.569 (0.160)
	Single	4 (26.67)	11 (73.33)	
	Divorced	3 (20)	12 (80)	
	Separated	1 (11.11)	8 (88.89)	
Parents living together	*Yes*	134 (39.30)	207 (60.70)	1.598(0.206)
	No	15 (30.00)	35 (70.00)	
Effect of chronic illness	*Yes*	11 (14.67)	64 (85.33)	21.375**(<0.001)**
	No	137 (43.49)	178 (56.51)	
Effect of peer pressure on eating habits	*Yes*	8 (13.56)	51 (86.44)	16.791 **(<0.001)**
	No	136 (41.59)	191 (58.41)	
Effect of peer pressure on the perception of body image	*Yes*	18 (17.65)	84 (82.35)	23.037 **(<0.001)**
	No	125 (44.48)	156 (55.52)	
Parental concern about body image and weight	*Yes*	33 (23.40)	108 (76.60)	16.914**(<0.001)**
	No	105 (44.50)	131 (55.51)	
Experienced Bullying	*Yes*	40 (26.14)	113 (73.86)	513.937**(<0.001)**
	No	101 (45.09)	123 (54.91)	
Major life change	*Yes*	63 (30.73)	142 (69.27)	11.444**(0.001)**
	No	83(47.70)	91 (52.30)	
Smoking	***Yes***	4 (26.67)	11 (73.33)	0.869(0.351)
	No	147 (38.58)	234 (61.42)	
Drink alcohol	*Yes*	10 (38.46)	16 (61.54)	1.290 (0.256)
	No	106 (28.04)	272 (71.96)	
Food availability in the house	More than sufficient	49 (32.03)	104 (67.97)	4.669(0.198)
	Insufficient	6 (54.55)	5 (45.46)	
Extracurricular activities	***Yes***	124 (38.15)	201 (61.85)	1.164(0.435)
	No	22 (40.00)	33(60.00)	
	Widowed	3 (37.50)	5 (62.50)	

Other studies also reported higher prevalence in different geographical areas such as Saleh *et al* (Saleh *et al*., 2018) Badrah *et al*(Badrah *et al*., 2020) and Croll *et al*(Croll *et al*., 2002) Reason for such higher prevalence when compared to other published work is still not very clear but suggests the significant burden of DEB among adolescents and young adult and is alluding to the fact that the magnitude of disordered eating behaviours is huge among adolescents in most countries of the world including the middle and low-income countries as shown by this study. The implication is that the number of adolescents at risk of developing full-blown FEDs in the nearest future is massive and therefore there is a need for increased awareness among parents and health care professionals, and a need for regular screening, and health education on their prevention and control. Policies for routine screening for DEBs in every secondary school could aid early diagnosis, and prompt initiation of treatment.

Table 5:
Univariate and adjusted logistic regression for factors associated with FEDs

		Unadjusted OR			Adjusted OR		
		OR	95% CI	P	OR	95% CI	P
Effect of chronic illness	*Yes*	4.48	2.28, 8.82	0.000	4.43	1.87, 10.45	**0.001**
	No	1	-		1	-	
Effect of peer pressure on ED	Yes	4.54	2.09, 9.87	0.000	2.28	0.85, 6.109	0.100
	No				1	-	
Effect of peer pressure on perception of body image	Yes	3.374	2.13, 6.55	0.000	2.159	1.06, 4.39	**0.034**
	No	1			1		
Parental concern	Yes	2.63	1.65, 4.18	0.000	2.125	1.23, 3.66	**0.007**
	No				1	-	
Bullying	Yes	2.32	1.48, 3.63	0.000	1.656	0.982, 2.792	0.058
	No				1	-	
Major life change	*Yes*	2.06	1.35, 3.12	0.001	1.793	1.08, 2.95	**0.022**
	No	1	-		1	-	

Table 6:
Association between DEBs, FEDs and nutritional status among 411 schooling adolescents in IBNLGA

Variable	**Disordered Eating Behaviours**		**Chi-Square(P-value)**
	Yes (%)	**No (%)**	
Nutritional Status			0.677(0.879)
Underweight	14 (25.00)	42 (75.00)	
Normal Weight	82 (28.08)	210 (71.92)	
Overweight	12 (31.58)	26 (68.42)	
	Feeding and Eating Disorders		
	Yes (%)	**No (%)**	
Nutritional Status			8.891 (0.031)
Underweight	25 (45.46)	30 (54.55)	
Normal Weight	105 (36.84)	180 (63.16)	
Overweight	19 (52.78)	17 (47.22)	
Obese	4 (17.39)	19 (82.61)	

Concerning factors associated with the presence of DEB among adolescents, factors such as the presence of chronic illness, peer pressure, parental concern about body image and presence of major life events in the recent past are that are significantly associated from this study have been documented by other researchers in literature.(Wang *et al*., 2013; Lie *et al*., 2019; Mazubir *et al*., 2020) A higher prevalence of DEB has been documented among adolescents with diabetes, celiac disease, chronic painful conditions, inflammatory bowel diseases and many other chronic medical and surgical illnesses as found in this study.(Satherley *et al*., 2016; Sim *et al*., 2017; Toni *et al*., 2017) This emphasizes the need to pay a special attention to the eating pattern of every child and adolescent with chronic illnesses to prevent their tendency of developing DEB and prevent FEDs later in life. The effect of peer pressure on the development of DEB cannot be overemphasized as this study has revealed and it is in consonant with the findings of Meyer *et al*(Meyer and Gast, 2008), Lieberman *et al*(Lieberman *et al*., 2001), Nihaya *et al*(Al-Sheyab *et al*., 2018) and Halliwell *et al*(Halliwell and Harvey, 2006) who found that comparison among peer and peer pressure desire to be thin was most strongly related to body dissatisfaction among adolescents. Therefore, preventive measures should focus on discouraging peer pressure toward thin body shapes, and other body shape related teasing among adolescents. (Halliwell and Harvey, 2006)

The effect of parental concern about weight and body shape found in this study has been documented previously in literature by Berge *et al*(Berge *et al*., 2013), Chng *et al*(Chng and Fassnacht, 2016), Solano *et al*(Solano-Pinto *et al*., 2021) and many others in support of our findings in this study. Larsen *et al*(Larsen *et al*., 2015) in a systematic review of forty-four studies on determinants of early-onset DEBs among children noted that parental apprehensions about a child's weight and eating are important elements for the development of DEBs in their child. Loth *et al*(Loth *et al*., 2008) have also reported that major stressful life events were positively associated with risky weight control activities and with binge eating among both male and female adolescents as found in this study. (Loth *et al*., 2008) This implies the need to follow up and pay a close surveillance on adolescents who are experiencing major life events so as to offer direct and in-direct preventive and control interventions. (Loth *et al*., 2008) Other evidence from literature also suggests that major native life events have been significantly associated with the onset of full-blown FEDs such as BN, AN, BEG and so on as documented by Welch *et al*(Welch *et al*., 1997), Shankar-Krishnan *et al*(Shankar-Krishnan *et al*., 2021), Pike *et al*(Pike *et al*., 2006) and many others. (Tyrka *et al*., 2000)

While our study did not find any association between DEBs and gender and maternal educational status, Yirga *et al*(Yirga *et al*., 2016) found a significant association between DEBs and being female, and maternal educational status. The socio-economic status of participants' parents was not statistically significantly associated with DEB as found by Fortes *et al*(Fortes *et al*., 2013) in their study. Reasons for this

disparity could be as a result of ethnicity, or the varying developmental state of the countries where the study was conducted.(Croll *et al*., 2002; Fortes *et al*., 2013) Such ethnic and geographical variations were documented by Croll *et al*(Croll *et al*., 2002) when they found that Hispanic and American Indian youth reported a higher prevalence of DEB than others, and that the risk and protective factors for DEB were similar across gender but differs across ethnicity. (Croll *et al*., 2002) Other factors not studied in this work but found to be protective against DEB include structured regular family meal.(Neumark-Sztainer *et al*., 2004)

Concerning the prevalence of FEDs, not so much has been reported in Africa and especially in Nigeria among adolescents following the newly formulated DSM 5. Most reports are on the subtype of the FEDs and not in general. Report on the prevalence of Pica among adolescents is scarce but it is commonly reported by pregnant women and young children. (Mills, 2007; Young *et al*., 2011) Pica and rumination disorders have been termed the understudied feeding disorders. (Murray *et al*., 2018) A prevalence of 28.20% reported from this study for pica is considerable, but similar to a report from a study in Madagascar in the year 2009 where they reported a prevalence of 25%, 80% and 40% among males, and 53%, 80% and 12% for females for geophagy, amylophagy and other food substances respectively among adolescents aged 12-16years all of which are sub-set of pica. (Golden *et al*., 2012) Prevalence from this study is higher than many other reports among children and adolescents, such as one from a German study involving 804 participants which documented that 12.3% have engaged in pica at one time or the other in their lives. (Hartmann *et al*., 2018) Other similar studies revealed a prevalence of 10% and 7.2% in Switzerland and Egypt respectively. (El nemer, 2014; Murray *et al*., 2018)

Reports on prevalence of rumination disorders among adolescents are scarce in the literature probably because RD was recently grouped with FEDs in the latest DSM 5 classification as opposed to its earlier affinity with functional gastro-intestinal diseases except for a few articles that used clinical evaluation and other tools for its assessment.(Lindvall Dahlgren *et al*., 2017) A 10.5% prevalence from this study is close to that reported by Murray *et al* (9.7%) using the EDY-Q data behaviour tool among 1430 participants in Switzerland. (Qian *et al*., 2021) Findings from this study are also in consonant with the report by Hartmanns *et al*(Hartmann *et al*., 2018) who found a prevalence of 11.49% among participants aged 7-14years. (Hartmann *et al*., 2018) Rumination is said to be commoner among institutionalised children especially those with an intellectual disability where prevalence is said to range between 6-10% with a scarcity of data among schooling adolescents and adults. (Sheaffer, 2021) Findings from this study, which was based on individual reports of adolescents are in support of the fact that the prevalence is possibly increasing among adolescents as documented in literatures or that physicians are just noticing it more often than before. (Richter, 2011)

The prevalence of avoidant/restrictive food intake disorder using the DSM 5 criteria has not been documented in many communities. The prevalence from this study (16.8%) is lower but close to the findings of Nicely *et al*(Nicely *et al*., 2014) among 177 children and adolescents aged 7-17 years with eating disorders between 2008 and 2012 where they reported a prevalence of 22.5% among children coming for treatment for FEDs and other co-morbid psychopathology. About a quarter of their patients with FEDs had ARFID as opposed to 16.8% of the healthy population in our study.

While most studies on BN and AN in Africa in recent times did not assess their formal diagnosis using the DSM 5 criteria but evaluated DEBs, however, the prevalence of BN and AN recorded in this study (12.3% and 14.10% respectively) are higher than what has been documented by other researchers and in many systematic reviews across the world as most of them reported a three month or one-year prevalence that ranged between less than 1% and 4.2% using the DSM 5 criteria.(Swanson *et al*., 2011; Qian *et al*., 2013; Hay *et al*., 2015; Keski-Rahkonen and Mustelin, 2016; Kolar *et al*., 2016; van Eeden *et al*., 2021) However, the findings from this study fall within the estimates of symptomatic expressions of FEDs documented by Nagl *et al*(Nagl *et al*., 2016) which ranged between 14 and 36%, especially among female adolescents. Higher prevalence recorded from this study for both AN and BN could also be a result of employing a self-administered questionnaire for the secondary school students in a community-based study as opposed to the comprehensive clinical and mental evaluation employed by most other authors in their different hospital-based studies. (Hay *et al*., 2015; Damour, 2021) The finding of a prevalence of 22.28% for DEBs using the SCOFF tool, which is primarily meant to screen for risk of AN and BN suggests a high prevalence of these conditions among Nigerian adolescents but could however be further investigated by subjecting those that screened positive using SCOFF criteria to further structured clinical evaluation using the DSM5 criteria in a two-stage evaluation method. (Ehimigbai *et al*., 2017b) The significantly high prevalence of full threshold AN, BN and other FEDs that are previously known to be rare could also be a result of the effect the pandemic has had on the eating habits of adolescents as a result of higher exposure to social media during the lockdown that might have influenced their perceived body shape. (Damour, 2021) This explosion in the prevalence of FEDs following the pandemic has been observed in some settings and reported anecdotally by Bryn Austin, a professor at Harvard school of public health but this still warrants further evidence-based scrutiny. (Bryn, 2021; Damour, 2021)

As stated in this study, BEDCwas reported in 31.9% of the study participants, which is considerably high but similar to a prevalence of 30.2% observed among Indian adolescents by Bachi *et al*(Bachi, 2019) in 2019 using a modified questionnaire, but higher when compared to the findings of Gan *et al*(Gan *et al*., 2018) among Malaysian adolescents aged 10-16 years where he documented a prevalence of 14%. Goossens *et al*(Goossens *et al*., 2009) also reported a lower prevalence of 17% among adolescents attending secondary schools in Belgium. Higher prevalence in this study than most of the previously reported studies may suggest a rising burden of this condition as it has been attributed to the many factors including the recent pandemic and the associated loss of familiar routines, increased regular interactions with friends, boredom, and possible rising food insecurity at homes. (Damour, 2021)

Several factors associated with FEDs have been documented in the literature with varying strengths of association because FEDs are complex disorders, and the sub-types are better evaluated individually and not collectively.(Portela de Santana *et al*., 2012b) However, similar findings on associated factors have been documented by authors like Portela *et al* 2012.(Portela de Santana *et al*., 2012b)

There is no statistically significant relationship between DEBs and nutritional status in this study which is contrary to the report by Caran *et al*(Caran *et al*., 2018) among 894 Brazilian where DEBs were higher among overweight adolescents than those with normal weights. While their study is similar to this in those similar ages were studied, and that the WHO BMI chart was used in classifying nutritional status, however, the screening methods used were not the same. Caran *et al*(Caran *et al*., 2018) used the Eating Attitude and the Bulimic Investigatory Tests, while the SCOFF tool was used in our study. This could account for differing results. Other authors have documented a significant relationship between DEBs and nutritional status suggesting the possibility of shared risk factors among both contrary to finding from this study. (Leme *et al*., 2020) Neumark-Sztainer *et al*(Neumark-Sztainer *et al*., 2006) also reported that adolescents using weight-control behaviours were at risk of being overweight and of developing BED five years later than those not engaging in any form of dieting in their longitudinal study of 2,516 adolescents from diverse ethnic and socioeconomic backgrounds over five years.(Neumark-Sztainer *et al*., 1998) However, this study showed that there is a significant association between FEDs and nutritional status which is in consonant with the findings of Musaiger *et al*(Musaiger *et al*., 2012) and other authors.

The Limitations of the present study are that a structured full clinical assessment could not be carried out using the DSM 5 tool and that a larger sample size of adolescents involving both rural and urban part of the state or country would have been preferable as it will enable us to be able to generalise our findings to the country as a whole.

The Important conclusions that may be drawn from this study is that DEBs are not rare among the studied schooling adolescent population and thus many adolescents in this population will soon develop one sub-type of FEDs or the other. Similarly, many studied participants met the criteria for FEDs. This implies that adolescents in secondary schools should be routinely screened for DEBs using an easy tool like SCOFF to identify those at risk of FEDs early and refer them for further structured clinical evaluation, prompt treatment and follow up. Secondly, this study demonstrated that the presence of chronic illness, the effect of peer pressure on eating habits, parental concern about body image and the presence of major life events were independently associated with the DEBs/FEDs and are therefore important predictors and determinants of DEBs. Therefore, closer attention should be given to the feeding and eating attitudes, behaviours and patterns of adolescents with chronic conditions and efforts made to optimize their nutrition and prevent the development of DEBs and full-blown FEDs later in life.

We also established that FEDs are not limited to female adolescents but are also common among male adolescents in IBNLGA. It is also clear from our findings that malnutrition (underweight, overweight and obesity) has an important relationship with FEDs among adolescents, and so policies to allow routine screening for both FEDs and malnutrition should be enforced in both government and private schools.

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