Research article

Social connectedness and health risk behaviours among in-school adolescents in urban and rural areas of Oyo State, Nigeria

AKINWUMI OYEWOLE AKINDELE[1], AYODEJI MATTHEW ADEBAYO[1,2]
[1] Department of Community Medicine, University College Hospital, Ibadan, Nigeria;
[2] Department of Community Medicine, College of Medicine, University of Ibadan, Ibadan, Nigeria

Keywords

In-school adolescents • Sexual behaviour • Family connectedness • Rural-urban secondary schools • Adolescent health

Summary

Adolescents are considered vulnerable due to their ability to venture into Health Risk Behaviours (HRBs) that may have a long-term detrimental effect on their total wellbeing. The major focus of previous adolescents' studies in Nigeria has been on parent-adolescent communication and the relationship it has with their academic performance and sexual behaviour; none has explored the association of social connectedness and HRBs among in-school adolescents. Thus, the aim of this study is to assess and compare social connectedness and HRBs among in-school adolescents in urban and rural areas of Oyo State.

A school-based comparative cross-sectional design was employed wherein 2071 in-school adolescents were selected via a multistage cluster sampling in Ibarapa Central and Ibadan North Local Government Areas (LGAs) of Oyo State. The independent variables were socio-demographic characteristics, family characteristics and social connectedness while the dependent variable was HRBs. The data was analysed using descriptive statistics, chi square, t-test, ANOVA and logistic regression with level of statistical significance set at 5%.

Overall, slightly over one-half of the respondents (51.9%) were from the urban LGA and 54.2% were females. The mean age of respondents was 13.7 ± 2.1 years and 46.7% were early adolescents aged 10-13 years. The prevalence of HRBs among in-school adolescents was high (91.8%) and the mean score of social connectedness among in-school adolescents was high, with a slightly higher mean in rural area (131.71 ± 16.43) compared to (131.04 ± 14.47) in urban area. However, this was not statistically significant ($p = 0.322$). The mean scores of the domains of religious connectedness ($p = 0.176$), school connectedness ($p < 0.001$), peer connectedness ($p < 0.001$) and social-media connectedness ($p = 0.003$) were higher in the rural areas. However, the mean score of family connectedness among respondents was higher in the urban area ($p < 0.001$). The odds of having engaged in HRBs were significantly 1.57 times more likely among respondents who were males than those who were females {AOR = 1.57, 95% CI: 1.12- 2.19}. The odds of having engaged in HRBs was significantly 1.44 times more likely among respondents who live in an urban area than among those who live in a rural area {AOR = 1.44, 95% CI: 1.03-2.01}. For a unit increase in the total score of social-media connectedness of the students, the odds of having engaged in HRBs was reduced by 0.95 {AOR = 0.95, 95% CI: 0.92-0.99}.

There were significantly lower mean scores for social connectedness among respondents who had engaged in HRBs compared to their counterpart who had not engaged in HRBs.

Therefore, various efforts targeted at improving social connectedness with its domains could be recommended to prevent in-school adolescents from engaging in HRBs.

Introduction

Adolescents are an important segment of the Nigerian society as they constitute one-fifth of the population [1, 2]. Adolescence constitutes a critical and unique developmental period in life, which is usually regarded as the years between the onset of puberty and the establishment of social independence [3, 4]. Adolescents include the ages of 10-19 years, and represent the transitional stage between childhood and adulthood, which characterizes a stage of increasing demands from family, schools, and the broader society [3, 5-7].

Behavioural changes therefore, are elicited and established as a prominent consequence of both biological and environmental changes occurring at this period [8]. As a result of the many changes that are associated with this period, adolescents tend to engage in experimentation as they define their principles and seek autonomy [9]. Adolescence is a stage of identity formation and great pressure, thus, it presents an opportunity for picking up bad habits, and it also presents a golden opportunity for behaviour modification. During the adolescence phase, parents cease being the sole agent of socialization for adolescents [10] because this period is characterized as one where relationships with non-parental adults/individuals take on increased meaning because adolescents are seeking support, information and guidance from adults/individuals outside of their home. It is a period when adolescents begin to challenge family, school and religious controls, while there is increased influence by their peers and the social media [11]. The adolescence period is a turbulent phase of self-recognition when they come to rely more on extra familial relationships such as those found in schools, with friends, and social media. They are therefore considered vulnerable due to their ability to venture into Health Risk Behaviours (HRBs)

which may have a long-term detrimental effect on their total wellbeing [12]. Accordingly, many behaviours that lead to illness or premature death later in life such as sexual risk behaviours, substance use, unhealthy diet, and physical inactivity are often initiated and established during adolescence period since they are addictive behaviours [13, 14].

Globally, HRBs contribute to the leading causes of death and disability among adolescents [11, 15], as such, it is a public health burden whereby reducing HRBs among adolescents has become a global priority [16]. The initiation of HRBs in adolescents has been associated with sustained involvement in HRBs through adulthood [17, 18]. HRBs are defined by the Centres for Disease Control and Prevention (CDC) as those behaviours that contribute to the leading causes of morbidity, disability and mortality among adolescents [19]. The HRBs are preventable behaviours which pose immediate and future threats to adolescent health and they include behaviours that worsen the odds of illness [18]. These HRBs are classified into six categories namely: behaviours that contribute to unintentional injuries and violence; sexual behaviours related to unintended pregnancy and sexually transmitted diseases, including HIV infection; alcohol and other drug use; tobacco use; unhealthy dietary behaviours; and inadequate physical activity [20-23]. The initiation of HRBs in an adolescent is influenced by multiple factors at the level of the adolescent as well as those at the levels of their peer, family, community and society.

Connectedness has been defined as a sense of being cared for, supported, and belonging, and can be centered on feeling connected to school, family (i.e. parents and caregivers), or other important people and organizations in their lives [24]. Social connectedness comprises family connectedness, peer connectedness, religion connectedness, school connectedness and social media connectedness [25]. Adolescent's health and wellbeing are directly and indirectly influenced by the relationship with family and peers, number of close friends, level of confidence in neighbours, and involvement in religious events within the community. Studies have also shown that higher levels of social connectedness are associated with reduced stress, lower blood pressure, improved immunity, lower sexual risk behaviours as well as lower morbidity and mortality rates [25-28]. The ability of an adolescent to refuse indulgence in HRBs can be very difficult if the social environment is less supportive. The HRBs remain a public health burden and efforts at reducing it among adolescents have become a global priority. Therefore, interventions targeted at helping adolescents to avoid the initiation of HRBs are essential.

There are over 1.2 billion adolescents globally, with about 90% of them living in the developing countries [29]. Adolescents are increasingly establishing patterns of behaviour and lifestyle choices that affect both their current and future health, consequent upon which about 75% of adolescent illnesses and deaths are related to HRBs [19]. It is estimated that 70% of premature deaths among adults are due to HRBs initiated during adolescence [18].

Adolescents in Nigeria had previously received few interventions targeted at reducing HRBs because it was assumed that parents/guardians occupy a good position to shape and influence adolescent's behaviours; hence they were wrongly adjudged to be a healthy segment of the population. Moreover, it has been documented that appropriate interventions among adolescents have a far-reaching effect in reducing their HRBs [18]. In recent decades, health promotion interventions aimed at adolescents have predominantly focused on reducing individual health risk behaviour such as reducing sexual behaviour only, tobacco use only or alcohol use only [17]. The implementation of interventions that target HRBs are economical since HRBs are a constellation of multiple risk behaviours. Thus, it is more cost effective to target HRBs holistically compared to the implementation of several programs each targeting individual HRBs. The study was conducted to assess and compare social connectedness and HRBs among in-school adolescents in urban and rural areas of Oyo State.

Materials and methods

Study area

The study was carried out in Oyo State, Nigeria which is one of the 36 states of the Federal Republic of Nigeria; located in the South-Western geo-political zone of Nigeria. The National population census figures for 2006 indicate that the state has a population of 5,580,894 [1, 30] with a 2019 projection of 8,405,041 assuming an annual growth rate of 3.2% [31-33]. The secondary school enrolment rate in Oyo State is 66.6% [2]. Ibadan North Local Government Area is an urban LGA located in Oyo South Senatorial district, with a population of about 308,119 [30] according to the 2006 head count and population census in Nigeria. Assuming an annual growth rate of 3.2% [31-33], a 2019 projection of 464,039 was estimated. Ibarapa Central LGA has a population of about 103,243 [30] as per the 2006 head count and population census in Nigeria. Assuming an annual growth rate of 3.2% [31-33], a 2019 projection of 155,488 was estimated.

Study design

A school-based comparative cross-sectional design was conducted among urban and rural secondary school students using a quantitative approach, wherein 2071 in-school adolescents were selected via a multistage cluster sampling in Ibarapa Central and Ibadan North Local Government Areas of Oyo State.

Study instruments

Semi-structured interviewer-assisted questionnaire which was adapted and modified from the Global School-based Health Survey questionnaire [34] and from published literature [11. 25] was used.

Data collection methods

Data collection took place over an eight-week period between October and November 2019, and was conducted by the investigator and four research assistants with a minimum qualification of Ordinary National Diploma (OND). They were trained by the researcher and an epidemiologist over a two-day period on the contents and methods of questionnaire administration as well as maintenance of ethical standards. The research assistants were supervised regularly on the field to ensure good quality of data collection. Appropriate community entry was done at both the LGAs and the secondary schools' levels.

Eligibility criteria

All junior and senior secondary school students aged 10-19 years in urban and rural secondary schools in Oyo State were eligible while ill students and those absent from school on the day of the survey were excluded.

Measurement of variables

Family connectedness

Family connectedness scale is a 5-point likert-type 9-item scale ranging from 1, strongly disagree, to 5, strongly agree. Negative statements were reverse-coded so that in all cases, a high score reflected high connectedness. The total obtainable minimum and maximum scores were 9 and 45 respectively. The mean score of the responses to the nine statements was computed.

Religious connectedness

Religious connectedness scale is a 5-point likert-type 8-item scale ranging from 1, strongly disagree, to 5, strongly agree. Negative statements were reverse-coded so that in all cases, a high score reflected high connectedness. The total obtainable minimum and maximum scores were 8 and 40 respectively. The mean score of the responses to the nine statements was computed.

School connectedness

School connectedness scale is a 5-point likert-type 6-item scale ranging from 1, strongly disagree, to 5, strongly agree. Negative statements were reverse-coded so that in all cases, a high score reflected high connectedness. The total obtainable minimum and maximum scores were 6 and 30 respectively. The mean score of the responses to the seven statements was computed.

Peer connectedness

Peer connectedness scale is a 5-point likert-type 6-item scale ranging from 1, strongly disagree, to 5, strongly agree. Negative statements were reverse-coded so that in all cases, a high score reflected high connectedness. The total obtainable minimum and maximum scores were 6 and 30 respectively. The mean score of the responses to the seven statements was computed.

Social-media connectedness

Social-media connectedness scale is a 5-point likert-type 4-item scale ranging from 1, strongly disagree, to 5, strongly agree. Negative statements were reverse-coded so that in all cases, a high score reflected high connectedness. The total obtainable minimum and maximum scores were 4 and 20 respectively. The mean score of the responses to the seven statements was computed.

Social connectedness

Scores for family, religious, school, peer and social-media connectedness were totalled, forming a composite score of social connectedness, thereafter, the mean score was computed.

Inadequate physical activity

Physical inactivity: adolescents who had < 60 minutes of moderate-to-vigorous physical activity on any of the days within the past 7 days preceding the survey were identified as being physically inactive [35]. Physical activity included walking to school, riding a bicycle to school, playing football, running, and jogging.

Physical violence

Participation in physical violence were measured according to the question, "During the past 12 months, how many times were you in a physical fight?" [36].

Sexual intercourse

Participation in sexual intercourse was measured according to the question [36, 37]; "Have you ever had sexual intercourse?" The responses were 'No' or 'Yes'.

Unhealthy dietary behaviour

Participation in unhealthy dietary behaviour was measured according to the questions, "During the past 30 days, how many times per day did you usually eat fruit such as oranges, pineapple, pawpaw, bananas, pears or apples?" [38]. "During the past 30 days, how many times per day did you usually eat vegetables such as greens, ugwu, okro, ewedu, or carrots? [38]. Respondents who had less than five servings of fruits and vegetables on any of the days in the last 30 days preceding the survey were classified as having unhealthy dietary behaviour [35, 39, 40].

Alcohol use

Participation in alcohol and other drug use was measured according to the question [37]; "Have you ever taken alcohol? "The responses were 'No' or 'Yes'.

Tobacco use

Participation in tobacco use was measured according to the question [41]; "Have you ever smoked tobacco products?" The responses were 'No' or 'Yes'.

HRBs

The presence of at least one of the domains of HRBs was regarded as presence of HRBs in the adolescent.

Parents' socio-economic status

The adolescents' social status was determined by allocating them into their parents' or guardians' social classes, since they were still dependent. Parents' social classification was done according to their occupation level and highest educational attainment at the time of data collection, based on Oyedeji's socio-economic classification [42] and other published literature [35].

The grouping of adolescents' parents' occupational class was done as follows:

- Class 5 was allocated to senior public servants, professionals, managers, businessmen and contractors;
- Class 4 was allocated to intermediate grade civil servants, senior secondary school teachers and nurses;
- Class 3 was allocated to skilled workers such as junior school teachers, artisans and professional drivers;
- Class 2 was allocated to unskilled workers such as petty traders and labourers;
- Class 1 was allocated to housewives, full house husbands, unemployed and subsistence farmers.

The grouping of highest educational attainment class was done as follows:

- Class 5 was allocated to university graduates or equivalents;
- Class 4 was allocated to teaching or other professional training certificate holders, e.g. National College of Education, school of nursing;
- Class 3 was allocated to secondary school certificate holders;
- Class 2 was allocated to primary school certificate holders;
- Class 1 was allocated to illiterates and those who could only read and/or write.

Social status was determined by adding an adolescent's father's occupational class and mother's educational class scores [35]. For paternal orphans, the surviving mother's occupational class and educational class scores was summed. While, for maternal orphans, the surviving father's occupational class and educational class scores were summed. The minimum and maximum obtainable scores were 2 and 10 respectively. Scores ranging from 2 to 4 were classified as low social class, 5 to 7 classified as middle social class and 8 to 10 classified as high social class [35].

Statistical analyses

Data were analysed using SPSS version 20. The recoding of variables was done as needed.

Descriptive statistics: categorical variables such as type of school, class, sex, ethnic group, religion, parents' marital status, parents' highest level of educational attainment and family structure were summarised as frequencies, proportions and percentages. Appropriate tables and charts were used to display results. Quantitative variable such as mean-age was summarised with means and standard deviation. Comparisons were made in each case between urban and rural students.

Bivariate analyses: bivariate analyses were run with HRBs as the dependent variable and socio-demographic characteristics, family characteristics as well as social connectedness (family, religion, school, peer and social-media) as independent variables at 5% level of significance. Chi-square tests were used for binary and categorical variables such as sex, ethnicity and parents' socio-economic status; student t-test was used to compare means of normally distributed continuous variables such as age and mean scores of social connectedness with its domains (family, religion, school, peer and social-media); while, ANOVA examined differences of numeric variables between two or more groups.

Multivariate analyses: variables significant from the bivariate analysis at 5% were entered into the logistic regression to identify the predictors of HRBs among adolescents.

Check for internal consistency of scales

The internal consistency of family, religion, school, peer and social media connectedness scales were assessed using Cronbach's alpha (a test of internal consistency which measures if the same concepts are being measured across the scales).

Limitations

Social desirability bias: it is possible for some students to under-report their HRBs. This was minimized by privacy in data collection, and assurance of confidentiality and anonymity.

Inability to determine causality: the cross-sectional nature of data collection was likely to preclude any inferences about the cause-and-effect relationships between social connectedness and the independent variables as time sequence criteria cannot be fulfilled. Rather only statistical associations could be established.

Tab. I. Internal consistency of connectedness scales.

Variable	Mean	SD	N. of items	Cronbach's alpha
Family connectedness	38.66	5.55	9	0.800
Religious connectedness	33.26	4.91	8	0.702
School connectedness	25.21	3.63	6	0.592
Peer connectedness	22.24	4.53	6	0.633
Social-media connectedness	12.95	4.00	4	0.598
Social connectedness	132.32	15.62	33	0.848

Tab. IIa. Socio-demographic and school characteristics of in-school adolescents by location.

Variables	Location		Total	χ^2	p-value
	Urban (N = 1075) n (%)	Rural (N = 996) n (%)	(N = 2071) n (%)		
Sex					
Male	527 (49.0)	421 (42.3)	948 (45.8)	9.502	**0.002***
Female	548 (51.0)	575 (57.7)	1123 (54.2)		
Age (years)					
10-13	518 (48.2)	449 (45.1)	967 (46.7)	2.004	0.367
14-16	464 (43.2)	456 (45.8)	920 (44.4)		
17-19	93 (8.6)	91 (9.1)	184 (8.9)		
Mean ± SD	13.57 ± 2.14	13.82 ± 2.01	13.69 ± 2.08	-2.667[§]	**0.008***
Ethnicity					
Yoruba	934 (86.8)	955 (95.9)	1889 (91.2)	54.070	**< 0.001***
Igbo	76 (7.1)	22 (2.2)	98 (4.7)		
Hausa	44 (4.1)	9 (0.9)	53 (2.6)		
Others[#]	21 (2.0)	10 (1.0)	31 (1.5)		
Religion					
Christianity	622 (57.9)	436 (43.8)	1058 (51.1)	41.048	**< 0.001***
Islam	453 (42.1)	560 (56.2)	1013 (48.9)		
School type					
Public	644 (59.9)	606 (60.8)	1250 (60.4)	0.189	0.663
Private	431 (40.1)	390 (39.2)	821 (39.6)		
Class					
JSS (1-3)	550 (51.2)	577 (57.9)	1127 (54.4)	9.550	**0.002***
SSS (1-3)	525 (48.8)	419 (42.1)	944 (45.6)		
Marital status					
Single	1073 (99.8)	988 (99.2)	2061 (99.5)	4.098	**0.043***
Married	2 (0.2)	8 (0.8)	10 (0.5)		
Family structure (N = 2056)					
Monogamy	860 (80.1)	653 (66.5)	1513 (73.6)	48.657	**< 0.001***
Polygamy	214 (19.9)	329 (33.5)	543 (26.4)		

[#] Ebira, Igede, Fulani, Tiv, Ijaw, Urhobo, Itsekiri, Okun. [§] t-test. * Statistically significant at $p < 0.05$.

Ethical considerations

Ethical approval for the study was sought and obtained from the Oyo State Research Ethics Review Committee (AD13/479/960). Permission was obtained from the school authorities. Letters were written to their parents for their consent. Informed consent was obtained from participants 18 years and below while assent was gotten from participants < 18 years. Findings from the study were communicated to the school heads and the Parent Teachers Association chairman as feedback.

Results

Introduction

Totally, 2128 in-school adolescents were approached for the study in both the urban and rural LGAs. However, two thousand and seventy-one (2071) consented to be interviewed giving a response rate of 97.3%. Of the 2071 in-school adolescents, 1075 (51.9%) were from the urban LGA while 996 (48.1%) were from the rural LGA.

Socio-demographic and other characteristics of in-school adolescents

The socio-demographic and other characteristics of the in-school adolescents are shown in Tables II. The variables that showed statistically significant differences between the urban and rural areas were sex ($p = 0.002$), ethnicity ($p = 0.008$), religion ($p < 0.001$), marital status ($p = 0.043$), family structure ($p < 0.001$), parents' marital status ($p < 0.001$), living status ($p = 0.045$), class ($p = 0.02$), educational sponsor ($p = 0.010$), fathers' highest education ($p < 0.001$), mothers' highest education ($p < 0.001$) and parents' socio-economic status ($p < 0.001$).

Overall, there were more females 1123 (54.2%) than males 948 (45.8%). A significantly higher proportion 575 (57.7%) of the in-school female adolescents were from the rural area compared to 548 (51.0%) from the urban area. The highest proportion 967 (46.7%) of respondents were early adolescents aged 10-13 years. The mean age of respondents in the rural LGA was 13.8 ± 2.0 years which was slightly higher than those in the urban LGA, 13.6 ± 2.1 years.

One thousand eight hundred and eighty-nine (91.2%) of

Tab. IIb. Family characteristics of in-school adolescents by location.

Variables	Location		Total	χ^2	p-value
	Urban (N = 1075) n (%)	Rural (N = 996) n (%)	(N = 2071) n (%)		
Parents' marital status					
Never married	6 (0.6)	30 (3.0)	36 (1.7)	38.055	< 0.001*
Married/together‡	1027 (95.5)	882 (88.6)	1909 (92.2)		
Married/not together‡‡	42 (3.9)	84 (8.4)	126 (6.1)		
Living status					
Both parents	883 (82.2)	787 (79.0)	1670 (80.7)	9.722	0.045*
Father only	25 (2.3)	34 (3.4)	59 (2.8)		
Mother only	95 (8.8)	121 (12.2)	216 (10.4)		
Relatives	69 (6.4)	51 (5.1)	120 (5.8)		
Others###	3 (0.3)	3 (0.3)	6 (0.3)		
Sponsor					
Father only	72 (6.7)	86 (8.6)	158 (7.6)	11.370	0.010*
Mother only	90 (8.4)	117 (11.8)	207 (10.0)		
Both parents	887 (82.5)	763 (76.6)	1650 (79.7)		
Guardian	26 (2.4)	30 (3.0)	56 (2.7)		
Fathers' highest education (N = 2032)					
Primary or none	50 (4.7)	105 (10.8)	155 (7.6)	40.630	< 0.001*
Secondary	317 (30.0)	346 (35.5)	663 (32.6)		
Tertiary	691 (65.3)	523 (53.7)	1214 (59.8)		
Mothers' highest education (N = 2061)					
Primary or none	79 (7.4)	117 (11.8)	196 (9.5)	28.621	< 0.001*
Secondary	355 (33.2)	395 (39.9)	750 (36.4)		
Tertiary	636 (59.4)	479 (48.3)	1115 (54.1)		
Parents' SES					
Low	36 (3.3)	90 (9.0)	126 (6.1)	66.496	< 0.001*
Middle	704 (65.5)	725 (72.8)	1429 (69.0)		
High	335 (31.2)	181 (18.2)	516 (24.9)		

‡ Married and currently living together. ‡‡ Married and currently not living together. ### Living alone and with guardians. SES: Socio-economic status. * Statistically significant at $p < 0.05$

the in-school adolescents are of Yoruba descent (one of the major ethnic groups in Nigeria) with a higher proportion in the rural area 955 (95.9%) compared to 934 (86.8%) in the urban area. A significantly higher proportion 622 (57.9%) of respondents were Christians in the urban area compared to 436 (43.8%) in the rural area. Majority of the in-school adolescents 2061 (99.5%) were single, with a higher proportion in the urban area 1073 (99.8%) compared to 988 (99.2%) in the rural area. A higher proportion of respondents were from the monogamous family setting in the urban area 860 (80.1%) compared to 653 (66.5%) of the respondents from the rural area. The proportion of respondents' parents' marital status who were married and living together were higher in the urban area 1027 (95.5%) compared to 882 (88.6%) in the rural area. In terms of living arrangement, a significantly higher proportion 883 (82.2%) of respondents live with both parents in the urban area compared to 787 (79.0%) in the rural area. A higher proportion of respondents' education was sponsored by both parents in urban area 887 (82.5%) compared to 763 (76.6%) of respondents in the rural area. A higher proportion 691 (65.3%) of the in-school adolescents' fathers had tertiary education in the urban area compared to 523 (53.7%) of respondents in the rural area. A significantly higher proportion 636 (59.4%) of respondents' mothers had tertiary education in the urban area compared to 479 (48.3%) in the rural area. In terms of parents' social class, there was a higher proportion 725 (72.8%) of in-school adolescents in the middle social class in rural area compared to 704 (65.5%) in the urban area.

Prevalence of HRBs

Overall, 91.8% of the respondents had ever engaged in HRBs, with a significantly higher proportion 93.9% in the urban area compared to 89.7% in the rural area ($p < 0.001$).

Association between respondents' characteristics and social connectedness in urban and rural areas

Among the in-school adolescents in the urban area, being a male, being an early adolescent, being of minority ethnic group, being in a Junior Secondary School (JSS) class and education being sponsored by both parents were significantly associated with social connectedness ($p < 0.05$).

Tab. IIIa. Mean comparison of respondents' characteristics and social connectedness in urban and rural areas.

Variables	Social connectedness (Mean ± SD)	
	Urban (N = 1075)	Rural (N = 996)
Sex		
Male	132.22 ± 14.32	132.18 ± 15.86
Female	129.90 ± 14.54	131.37 ± 16.84
	t test = 2.636; p = 0.009*	t test = 0.776; p = 0.438
Age (years)		
10-13	132.83 ± 13.98	132.73 ± 15.08
14-16	130.27 ± 14.56	132.16 ± 17.25
17-19	124.89 ± 14.79	124.40 ± 16.93
	F (2, 1072) = 13.304; p < 0.001*	F (2, 993) = 10.251; p < 0.001*
Ethnicity		
Yoruba	131.63 ± 14.29	131.78 ± 16.41
Igbo	127.68 ± 15.41	128.00 ± 19.84
Hausa	122.80 ± 14.86	134.44 ± 16.46
Others#	134.00 ± 14.47	130.50 ± 10.42
	F (3, 1071) = 7.053; p < 0.001*	F (3, 992) = 0.481; p = 0.696
Religion		
Christianity	130.72 ± 14.49	132.03 ± 16.78
Islam	131.47 ± 14.44	131.46 ± 16.16
	t test = -0.849; p = 0.396	t test = 0.548; p = 0.584
School type		
Public	130.48 ± 14.78	130.28 ± 16.81
Private	131.86 ± 13.96	133.93 ± 15.59
	t test = -1.536; p = 0.125	t test = -3.439; p = 0.001*
Class		
JSS (1-3)	132.29 ± 13.69	133.38 ± 15.82
SSS (1-3)	129.72 ± 15.14	129.42 ± 16.99
	t test = 2.924; p = 0.003*	t test = 3.783; p < 0.001*
Marital status		
Single	131.06 ± 14.47	131.80 ± 16.43
Married	118.00 ± 5.66	120.75 ± 13.58
	t test = 1.276; p = 0.202	t test = 1.897; p = 0.058
Family structure (N = 2056)		
Monogamy	131.13 ± 14.44	132.46 ± 16.18
Polygamy	130.77 ± 14.58	130.76 ± 16.77
	t test = 0.326; p = 0.744	t test = 1.533; p = 0.126

JSS: Junior Secondary School. SSS: Senior Secondary School. # Ebira, Igede, Fulani, Tiv, Ijaw, Urhobo, Itsekiri, Okun. * Statistically significant at p < 0.05.

Respondents who were males had higher mean social connectedness score (132.22 ± 14.32) than those who were females (129.90 ± 14.54). The mean social connectedness score decreases with increasing age. The highest mean social connectedness score was observed among early adolescents (132.83 ± 13.98) and least among late adolescents (124.89 ± 14.79). Respondents from ethnic minority group had higher mean social connectedness score (134.00 ± 14.47) than those from Yoruba ethnic group (131.63 ± 14.29), Igbo ethnic group (127.68 ± 15.41) and Hausa ethnic group (122.80 ± 14.86). Respondents in Senior Secondary School (SSS) class had lower mean social connectedness score (129.72 ± 15.14) than those in JSS class (132.29 ± 13.69). Respondents whose education were sponsored by both parents had higher mean social connectedness score (131.92 ± 14.32) than those sponsored by mothers only (127.74 ± 14.83), guardian (127.31 ± 13.82) and fathers only (125.61 ± 14.41).

Among the in-school adolescents in the rural area, being an early adolescent, attending a private school, being in a JSS class, parent being married and living together, living with both parents, education being sponsored by both parents, fathers' highest education being tertiary, mothers' highest education being tertiary and being in high social class were significantly associated with social connectedness ($p < 0.05$).

The mean social connectedness score decreases with increasing age. The highest mean social-media connectedness score was observed among early adolescents (132.73 ± 15.08) and least among late adolescents (124.40 ± 16.93). Students in public schools had lower mean social connectedness score (130.28 ± 16.81) than those in private schools (133.93 ± 15.59). Respondents in JSS class had higher mean social connectedness score (133.38 ± 15.82) than those in SSS class (129.42 ± 16.99). Respondents whose parents

Tab. IIIb. Mean comparison of respondents' characteristics and social connectedness.

Variables	Social connectedness (Mean ± SD)	
	Urban (N = 1075)	Rural (N = 996)
Parents' marital status		
Never married	120.83 ± 11.05	123.63 ± 19.98
Married/together‡	131.24 ± 14.47	132.26 ± 16.18
Married/not together‡‡	127.43 ± 14.13	128.81 ± 16.79
	F (2, 1072) = 2.913; p = 0.055	**F (2, 993) = 5.480; p = 0.004***
Living status		
Both parents	131.53 ± 14.43	132.54 ± 16.00
Father only	127.52 ± 14.02	124.00 ± 16.07
Mother only	129.72 ± 15.51	131.01 ± 18.06
Relatives	127.88 ± 13.13	126.35 ± 17.11
Others###	129.67 ± 20.74	120.00 ± 16.46
	F (4, 1070) = 1.651; p = 0.159	**F (4, 991) = 4.224; p = 0.002***
Sponsor		
Father only	125.61 ± 14.41	125.15 ± 18.72
Mother only	127.74 ± 14.83	128.92 ± 17.02
Both parents	131.92 ± 14.32	133.05 ± 15.87
Guardian	127.31 ± 13.82	127.33 ± 15.25
	F (3, 1071) = 6.709; p < 0.001*	**F (3, 992) = 8.268; p < 0.001***
Fathers' highest education (N = 2032)		
Primary or none	127.32 ± 15.74	126.24 ± 17.38
Secondary	130.59 ± 14.24	129.15 ± 15.59
Tertiary	131.49 ± 14.48	134.27 ± 16.21
	F (2, 1072) = 2.138; p = 0.118	**F (2, 993) = 16.975; p < 0.001***
Mothers' highest education (N = 2061)		
Primary or none	129.82 ± 15.72	127.47 ± 15.86
Secondary	130.41 ± 13.96	129.14 ± 16.65
Tertiary	131.63 ± 14.53	135.04 ± 15.73
	F (2, 1072) = 1.135; p = 0.322	**F (2, 993) = 19.281; p < 0.001***
Parents' SES		
Low	127.36 ± 16.51	125.41 ± 17.78
Middle	131.26 ± 14.18	131.40 ± 16.18
High	130.96 ± 14.83	136.09 ± 15.61
	F (2, 1072) = 1.251; p = 0.287	**F (2, 993) = 13.501; p < 0.001***

‡ Married and currently living together. ‡‡ Married and currently not living together. ### Living alone and with guardians. SES: Socioeconomic status. * Statistically significant at p < 0.05.

were married and currently living together had higher mean social connectedness score (132.26 ± 16.18) than those married and not currently living together (128.81 ± 16.79) and those never married (123.63 ± 19.98). Respondents who lived with both parents had higher mean social connectedness score (132.54 ± 16.00) than those who lived with mothers only (131.01 ± 18.06), relatives (126.35 ± 17.11), fathers only (124.00 ± 16.07) and those that lived alone as well as with guardians (120.00 ± 16.46). Respondents whose education were sponsored by both parents had higher mean social connectedness score (133.05 ± 15.87) than those sponsored by mothers only (128.92 ± 17.02), guardian (127.33 ± 15.25) and fathers only (125.15 ± 18.72). The mean scores for social connectedness was lowest for respondents whose fathers had primary or no education (126.24 ± 17.38) and it progressively increased with higher education, while fathers with tertiary education had the highest mean scores for social connectedness (134.27 ± 16.21). The mean scores for social connectedness was highest for respondents whose mothers had tertiary education (135.04 ± 15.73) and progressively reduced with lower education, while mothers with primary or no education had the lowest mean scores for social-media connectedness (127.47 ± 15.86). The higher the socioeconomic status the higher the mean social-media connectedness score. The mean scores for social-media connectedness was low for respondents from low socioeconomic level (125.41 ± 17.78), higher for respondents from middle socioeconomic level (131.40 ± 16.18) and highest for respondents from high socioeconomic level (136.09 ± 15.61) (Tab. IIIa-b).

Association between respondents' characteristics and HRBs

Among the in-school adolescents in the urban area, religion and type of school were significantly associated

Tab. IVa. Respondents' characteristics and HRBs in urban and rural areas.

Variables	Urban (N = 1075) HRBs		Rural (N = 996) HRBs	
	No n (%)	Yes n (%)	No n (%)	Yes n (%)
Sex				
Male	32 (6.1)	495 (93.9)	31 (7.4)	390 (92.6)
Female	34 (6.2)	514 (93.8)	72 (12.5)	503 (87.5)
	χ^2 = 0.008; p = 0.928		χ^2 = 6.975; p = 0.008*	
Age (years)				
10-13	31 (6.0)	487 (94.0)	50 (11.1)	399 (88.9)
14-16	30 (6.5)	434 (93.5)	49 (10.7)	407 (89.3)
17-19	5 (5.4)	88 (94.6)	4 (4.4)	87 (95.6)
	χ^2 = 0.201; p = 0.904		χ^2 = 3.856; p = 0.145	
Ethnicity				
Yoruba	58 (6.2)	876 (93.8)	97 (10.2)	858 (89.8)
Igbo	3 (3.9)	73 (96.1)	2 (9.1)	20 (90.9)
Hausa	3 (6.8)	41 (93.2)	3 (33.3)	6 (66.7)
Others[#]	2 (9.5)	19 (90.5)	1 (10.0)	9 (90.0)
	χ^2 = 1.123[¶]; p = 0.771		χ^2 = 3.542[¶]; p = 0.315	
Religion				
Christianity	30 (4.8)	592 (95.2)	40 (9.2)	396 (90.8)
Islam	36 (7.9)	417 (92.1)	63 (11.2)	497 (88.8)
	χ^2 = 4.439; p = 0.035*		χ^2 = 1.139; p = 0.286	
School type				
Public	30 (4.7)	614 (95.3)	64 (10.6)	542 (89.4)
Private	36 (8.4)	395 (91.6)	39 (10.0)	351 (90.0)
	χ^2 = 6.115; p = 0.013*		χ^2 = 0.081; p = 0.777	
Class				
JSS (1-3)	30 (5.5)	520 (94.5)	59 (10.2)	518 (89.8)
SSS (1-3)	36 (6.9)	489 (93.1)	44 (10.5)	375 (89.5)
	χ^2 = 0.917; p = 0.338		χ^2 = 0.020; p = 0.888	
Marital status				
Single	66 (6.2)	1007(93.8)	103 (10.4)	885 (89.6)
Married	0 (0.0)	2 (100.0)	0 (0.0)	8 (100.0)
	Fisher's exact test; p = 1.000		Fisher's exact test; p = 1.000	
Family structure (N = 2056)				
Monogamy	49 (5.7)	811 (94.3)	61 (9.3)	592 (90.7)
Polygamy	17 (7.9)	197 (92.1)	40 (12.2)	289 (89.5)
	χ^2 = 1.499; p = 0.221		χ^2 = 1.881; p = 0.170	

[#] Ebira, Igede, Fulani, Tiv, Ijaw, Urhobo, Itsekiri, Okun. [¶] Likelihood Ratio. * Statistically significant at p < 0.05.

with HRBs (p < 0.05). More Christians (95.2%) than Muslims (92.1%) had ever engaged in HRBs. A higher proportion (95.3%) of respondents in public schools than 91.6% in private schools had ever engaged in HRBs.

Among the in-school adolescents in the rural area, only sex was significantly associated with HRBs (p < 0.05). More males (92.6%) than females (87.5%) had ever engaged in HRBs (Tab. IV).

Mean comparison of social connectedness and HRBs in urban and rural areas

Social connectedness was significantly associated with having engaged in HRBs (p < 0.05) in both urban and rural areas. There were lower mean scores for social connectedness among respondents who had engaged in HRBs compared to their counterparts who had never engaged in HRBs in the urban area (130.69 ± 14.53) and rural area (131.24 ± 16.69) respectively.

Association between respondents' characteristics and HRBs in Oyo State

Among the in-school adolescents in Oyo State, sex, location, religion and family structure were significantly associated with HRBs (p < 0.05) More males (93.4%) than females (90.6%) had engaged in HRBs. More respondents in the urban area (93.9%) than 89.7% in the rural area had engaged in HRBs. A higher proportion (93.4%) of Christians than 90.2% of Muslims had engaged in HRBs. More respondents in monogamous family (92.7%) than 89.5% in polygamous family had engaged in HRBs (Tab. V).

Tab. IVb. Respondents' characteristics and HRBs in urban and rural areas.

Variables	Urban (N = 1075) HRBs		Rural (N = 996) HRBs	
	No n (%)	Yes n (%)	No n (%)	Yes n (%)
Parents' marital status				
Never married	0 (0.0)	6 (100.0)	3 (10.0)	27 (90.0)
Married/together‡	63 (6.1)	964 (93.9)	95 (10.8)	787 (89.2)
Married/not together‡‡	3 (7.1)	39 (92.9)	5 (6.0)	79 (94.0)
	χ^2 = 0.830¶; p = 0.660		χ^2 = 1.925; p = 0.382	
Living status				
Both parents	52 (5.9)	831 (94.1)	77 (9.8)	710 (90.2)
Father only	1 (4.0)	24 (96.0)	4 (11.8)	30 (88.2)
Mother only	8 (8.4)	87 (91.6)	19 (15.7)	102 (84.3)
Relatives	5 (7.2)	64 (92.8)	3 (5.9)	48 (94.1)
Others###	0 (0.0)	3 (100.0)	0 (0.0)	3 (100.0)
	χ^2 = 1.616¶; p = 0.806		χ^2 = 5.562¶; p = 0.234	
Sponsor				
Father only	2 (2.8)	70 (97.2)	12 (14.0)	74 (86.0)
Mother only	5 (5.6)	85 (94.4)	11 (9.4)	106 (90.6)
Both parents	58 (6.5)	829 (93.5)	78 (10.2)	685 (89.8)
Guardian	1 (3.8)	25 (96.2)	2 (6.7)	28 (93.3)
	χ^2 = 2.321¶; p = 0.508		χ^2 = 1.703; p = 0.621	
Fathers' highest education (N = 2032)				
Primary or none	2 (4.0)	48 (96.0)	7 (6.7)	98 (93.3)
Secondary	25 (7.9)	292 (92.1)	33 (9.5)	313 (90.5)
Tertiary	37 (5.4)	654 (94.6)	61 (11.7)	462 (88.3)
	χ^2 = 2.839; p = 0.242		χ^2 = 2.749; p = 0.253	
Mothers' highest education (N = 2061)				
Primary or none	6 (7.6)	73 (92.4)	8 (6.8)	109 (93.2)
Secondary	24 (6.8)	331 (93.2)	36 (9.1)	359 (90.9)
Tertiary	36 (5.7)	600 (94.3)	59 (12.3)	420 (87.7)
	χ^2 = 0.776; p = 0.678		χ^2 = 4.186; p = 0.123	
Parents' SES				
Low	2 (5.6)	34 (94.4)	9 (10.0)	81 (90.0)
Middle	45 (6.4)	659 (93.6)	71 (9.8)	654 (90.2)
High	19 (5.7)	316 (94.3)	23 (12.7)	158 (87.3)
	χ^2 = 0.226; p = 0.893		χ^2 = 1.339; p = 0.512	

‡ Married and currently living together. ‡‡ Married and currently not living together. ### Living alone and with guardians. SES Socioeconomic status. ¶ ikelihood Ratio. *Statistically significant at p < 0.05.

Predictors of HRBs among in-school adolescents in Oyo State

Table VI shows the predictors of having engaged in HRBs among in-school adolescents in Oyo State. The model included sex, religion, location, family structure, religious connectedness, school connectedness, peer connectedness and social-media connectedness.

The predictors of having engaged in HRBs in Oyo State were sex, location and social-media connectedness. The odds of having engaged in HRBs was significantly 1.57 times more likely among respondents who was males {AOR = 1.57, 95% CI: 1.12-2.19} than among females. The odds of having engaged in HRBs was significantly 1.44 times more likely among respondents who live in an urban area {AOR = 1.44, 95% CI: 1.03-2.01} than among those who live in a rural area. For a unit increase in the total score of social-media connectedness of the students, the odds of having engaged in HRBs was reduced by 0.95 {AOR = 0.95, 95% CI: 0.92-0.99} (Tab. VI).

Discussion

This study explored the predictors of HRBs among in-school adolescents in urban and rural areas of Oyo State. The mean age of respondents in the rural area was 13.8 ± 2.0 years which was slightly higher than those in the urban area, 13.6 ± 2.1 years. This is similar to findings from a study by Ilori and colleagues where there was a higher proportion in the rural area (14.3 ± 1.9 years) than in the urban area 13.9 ± 2.0 years [43]. This is of great interest because adolescents in older age groups

Table Va. Respondents' characteristics and HRBs in urban and rural areas

Variables	HRBs		χ^2	p-value
	No n (%)	Yes n (%)		
Sex				
Male	63 (6.6)	885 (93.4)	5.352	**0.021***
Female	106 (9.4)	1017 (90.6)		
Age (years)				
10-13	81 (8.4)	886 (91.6)	2.907	0.234
14-16	79 (8.6)	841 (91.4)		
17-19	9 (4.9)	175 (95.1)		
Location				
Urban	66 (6.1)	1009 (93.9)	12.179	**< 0.001***
Rural	103 (10.3)	893 (89.7)		
Ethnicity				
Yoruba	155 (8.2)	1734 (91.8)	2.128‡	0.546
Igbo	5 (5.1)	93 (94.9)		
Hausa	6 (11.3)	47 (88.7)		
Others#	3 (9.7)	28 (90.3)		
Religion				
Christianity	70 (6.6)	988 (93.4)	6.881	**0.009***
Islam	99 (9.8)	914 (90.2)		
School type				
Public	94 (7.5)	1156 (92.5)	1.725	0.189
Private	75 (9.1)	746 (90.9)		
Class				
JSS (1-3)	89 (7.9)	1038 (92.1)	0.229	0.633
SSS (1-3)	80 (8.5)	864 (91.5)		
Marital status				
Single	169 (8.2)	1892 (91.8)	§	1.000
Married	0 (0.0)	10 (100.0)		
Family structure (N = 2056)				
Monogamy	110 (7.3)	1403 (92.7)	5.576	**0.018***
Polygamy	57 (10.5)	486 (89.5)		

§ Fishers exact test. ‡ Likelihood Ratio. # Ebira, Igede, Fulani, Tiv, Ijaw, Urhobo, Itsekiri, Okun. * Statistically significant at p < 0.05.

are more likely to engage in HRBs than those in lower age groups.

A significantly higher proportion (82.2%) of respondents lived with both parents in the urban area compared to (79.0%) in the rural area. This is similar to findings from a Malaysian study where a higher proportion (95.6%) of adolescents lived with both parents in the urban area compared to 87.5% in the rural area.[44] Adolescents who lived with both parents could be better supervised compared to their colleagues who lived alone, with one parent or with a relative. Consequently, those respondents who lived with both parents had reduced chances of engaging in HRBs.

A higher proportion of respondents were from monogamous family settings in the urban area (80.1%) compared to respondents from the rural area (66.5%). Findings from this current study is significant because it has been reported that the odds of having engaged in HRBs was twice more likely among respondents who come from polygamous family than among those from monogamous family [36].

In terms of parents' social class, there was a higher proportion (31.2%) of in-school adolescents in the high social class in urban area compared to the rural area (18.2%). This is lower than findings from a study which reported 58.2% in the urban area and 38.6% in the rural area [45]. There are indications that family values and practices in our environment are changing with higher social class attainment as both parents are likely to be working or involved in trade thus, leading to reduced supervision of adolescents [46].

The predictors of HRBs in Oyo State were sex, location and social-media connectedness.

The odds of engaging in HRBs was more likely among respondents who were males than among females. Findings in the present study are consistent with earlier findings from Nigeria [36], Ethiopia [25, 47], Iran [48], Malaysia [44, 49] and Serbia [13] where the odds of having engaged in HRBs was more in males than in females. The more likely explanations are that males are more willing to take risks [50, 51], and have more freedom than females in their families [41, 52]. All these may lead to increased incidence of HRBs among males. Another reason is social desirability reporting bias in which

Table Vb. Respondents' characteristics and HRBs in urban and rural areas

Variables	HRBs		χ^2	p-value
	No n (%)	Yes n (%)		
Parents' marital status				
Never married	3 (8.3)	33 (91.7)	0.587	0.746
Married/together	158 (8.3)	1751 (91.7)		
Married/not together	8 (6.3)	118 (93.7)		
Living status				
Both parents	129 (7.7)	1541 (92.3)	6.749	0.150
Father only	5 (8.5)	54 (91.5)		
Mother only	27 (12.5)	189 (87.5)		
Relatives	8 (6.7)	112 (93.3)		
Others	0 (0.0)	6 (100.0)		
Sponsor				
Father only	14 (8.9)	144 (91.1)	0.757	0.860
Mother only	16 (7.7)	191 (92.3)		
Both parents	136 (8.2)	1514 (91.8)		
Guardian	3 (5.4)	53 (94.6)		
Fathers' highest education (N = 2032)				
Primary or none	9 (5.8)	146 (94.2)	1.466	0.480
Secondary	58 (8.7)	605 (91.3)		
Tertiary	98 (8.1)	1116 (91.9)		
Mothers' highest education (N = 2061)				
Primary or none	14 (7.1)	182 (92.9)	0.483	0.786
Secondary	60 (8.0)	690 (92.0)		
Tertiary	95 (8.5)	1020 (91.5)		
Parents' SES				
Low	11 (8.7)	115 (91.3)	0.058	0.971
Middle	116 (8.1)	1313 (91.9)		
High	42 (8.1)	474 (91.9)		

* Fishers exact test.

boys may exaggerate their HRBs, while girls under-report their HRBs [53].

The odds of having engaged in HRBs was more likely among respondents who live in the urban area than among those who live in the rural area. The finding is in contrast with earlier studies from Ethiopia in 2014 [47], Iran in 2017 [48] and Canada in 2019 [54] which reported that living in rural area was a significant predictor for engaging in HRBs among adolescents. Findings from this present study showed that there are more high social class families in the urban area compared to the rural area. This is noteworthy because studies have reported that students from higher social class families are more inclined to engage in HRBs compared to those from low social class families [48, 55].

For a unit increase in the total score of social-media connectedness of the students, the odds of having engaged in HRBs was reduced by 0.95. This is probably because most parents of in-school adolescents in this present study have at least secondary education as the highest educational attainment and also most families belong to the middle-high social class. The findings suggest that respondents have access to internet enabled devices and learnt health promoting behaviours via the contents viewed on social media specifically teachings that prevented unhealthy dietary behaviour. This also suggests that parents need to monitor their adolescents' use of the social-media so as to ensure that they are exposed to correct and age-appropriate contents which will reduce their chances of engaging in HRBs.

Conclusions

A high proportion of the respondents had ever engaged in HRBs, with a significantly higher proportion in the urban area compared to those in the rural area. Overall, the mean score of social connectedness among in-school adolescents was high, with no difference between the rural area and the urban area. There were significantly lower mean scores for social connectedness among respondents who had engaged in HRBs compared to their counterpart who had not engaged in HRBs. The odds of having engaged in HRBs was significantly 1.57 times more likely among respondents who were males than among females. The odds of having engaged in HRBs was significantly 1.44 times more likely among respondents who live in an urban area than among those who live in a rural area. For a unit increase in the total score of social-media connectedness of the students, the odds

Tab. VI. Multivariable logistic regression of selected variables and HRBs among respondents in Oyo State.

Variables	Odd ratio	95% Confidence interval		p-value
		Lower	Upper	
Sex				
Male	1.570	1.123	2.193	**0.008***
Female **(Ref)**	1.000			
Religion				
Christianity	0.726	0.521	1.010	0.057
Islam **(Ref)**	1.000			
Location				
Urban	1.439	1.031	2.009	**0.033***
Rural **(Ref)**	1.000			
Family structure				
Monogamy	0.751	0.530	1.064	0.107
Polygamy **(Ref)**	1.000			
Religious connectedness	0.984	0.944	1.025	0.443
School connectedness	0.958	0.910	1.008	0.100
Peer connectedness	0.966	0.922	1.011	0.135
Social-media connectedness	0.954	0.916	0.993	**0.022***

* Statistically significant at $p < 0.05$.

of having engaged in HRBs was reduced by 0.95. The Government-directed health promotion efforts would be more effective by building social connectedness in addition to only focusing interventions on individual risky behaviours. Findings suggest that schooling has protective effects on the adolescent's development beyond academic competence, thus, efforts are necessary to ensure that all school-aged adolescents are enrolled in school. Future research should examine the individual components of HRBs and social connectedness in order to elicit any associations. Also, longitudinal studies should be conducted to establish future risks of engaging in HRBs among adolescents.

Acknowledgements

Data for this publication was extracted from the dissertation submitted by AOA for the Fellowship of the West African College of Physicians in Community Health; AMA supervised the dissertation. The dissertation was self-funded.

Conflict of interest statement

The authors declare that they have no competing interests.

Authors' contributions

AOA participated in the study design, led data collection and statistical analysis, and drafted the manuscript; AMA participated in the study design, reviewed data analysis results, critically reviewed and finalised the manuscript. Both authors read and approved the final manuscript.

References

[1] NBS. National Bureau of Statistics. Annual Abstract of Statistics, 2016. Federal Republic of Nigeria 2016, pp. 1-10.

[2] National Population Commission (NPC) [Nigeria] and ICF. 2019. Nigeria Demographic and Health Survey 2018. Abuja, Nigeria, and Rockville, Maryland, USA: NPC and ICF 2019.

[3] UNICEF. United Nations Children's Fund. Progress for Children: A report card on adolescents - 2012, pp. 1-56.

[4] Curtis AC. Defining Adolescence. Journal of Adolescent and Family Health 2015;7:1-39. https://doi.org/http://scholar.utc.edu/jafh/vol7/iss2/2/

[5] Kelly M, Millar M. Exploring Adolescence and Parenthood: A Transitional Life Stage and Abrupt Life Change. J Comm Pub Health Nurs 2017;03:1-6. https://doi.org/10.4172/2471-9846.1000162

[6] Tanihata T, Kanda H, Osaki Y, Ohida T, Minowa M, Wada K, Suzuki K, Hayashi K. Unhealthy lifestyle, poor mental health, and its correlation among adolescents: A nationwide cross-sectional survey. Asia Pac J Public Health 2015;27:NP1557-NP1565. https://doi.org/10.1177/1010539512452753

[7] Qidwai W, Ishaque S, Shah S, Rahim M. Adolescent lifestyle and behaviour: A survey from a developing country. PLoS ONE 2010;5:1-6. https://doi.org/10.1371/journal.pone.0012914

[8] Mercy ON, Peter AS. Risky Sexual Behaviours Among Female in-School Adolescents in Delta, Nigeria: Self-Esteem, Parental Involvement and Religiosity As Predictors. Eur Sci J 2014;10:157-77.

[9] Kunnuji MON. Parent-child communication on sexuality-related matters in the city of Lagos, Nigeria. Afr Dev 2012;37:41-56.

[10] Han Y, Kim H, Lee D. Application of social control theory to examine parent, teacher, and close friend attachment and substance use initiation among Korean Youth. Sch Psychol Int 2016;37:340-58. https://doi.org/10.1177/0143034316641727

[11] Omotowo BI, Ndu AC, Agwu Umahi OR, Ezeoke UE, Arthur IC, Ancilla UK. Assessment of Health Risk Behaviours among Secondary School Students in Enugu, South-East, Nigeria. Glob J Health Sci 2017;9:57-66. https://doi.org/10.5539/gjhs.v9n7p57

[12] Okigbo CC, Kabiru CW, Mumah JN, Mojola SA, Beguy D. Influence of parental factors on adolescents' transition to first sexual intercourse in Nairobi, Kenya: A longitudinal study. Re-

prod Health 2015;12:1-12. https://doi.org/10.1186/s12978-015-0069-9

[13] Boričić K, Simić S, Erić JM. Demographic and socio-economic factors associated with multiple health risk behaviours among adolescents in Serbia: A cross sectional study. BMC Public Health 2015;15:1-9. https://doi.org/10.1186/s12889-015-1509-8

[14] Goldfarb SS, Locher JL, Preskitt J, Becker D, Davies SL, Sen B. Associations between participation in family activities and adolescent school problems. Child Care Health Dev 2017;43:361-8. https://doi.org/10.1111/cch.12434

[15] CDC. Centers for Disease Control and Prevention. Youth Risk Behavior Survey (YRBS) 2017 Standard Questionnaire Item Rationale. CDC 2017;75:1-45. https://doi.org/10.1001/jama.2010.1635.Centers

[16] WHO. Adolescent Health. The missing population in universal health coverage [Internet]. 2018 [cited 2019 May 10], pp. 1-32.

[17] Brooks FM, Magnusson J, Spencer N, Morgan A. Adolescent multiple risk behaviour: An asset approach to the role of family, school and community. J Public Health (Oxf) 2012;34(Suppl 1):48-56. https://doi.org/10.1093/pubmed/fds001

[18] WHO. World Health Organisation. Global Health Risks: Mortality and burden of disease attributable to selected major risks. Bull World Health Organ 2009;87:1-70. https://doi.org/10.2471/BLT.09.070565

[19] CDC. Centers of Disease Control and Prevention. 2017 National Youth Risk Behavior Survey. 2017, pp. 1-23.

[20] Booth FW, Roberts CK, Laye MJ. Lack of exercise is a major cause of chronic diseases. Compr Physiol 2012;2:1143-211. https://doi.org/10.1002/cphy.c110025.Lack

[21] CDC. Centers for Disease Control and Prevention. The Power of Prevention Chronic Disease. The public health challenge of the 21st century - 2009, pp. 1-18.

[22] Ekelund U, Steene-Johannessen J, Brown WJ, Fagerland MW, Owen N, Powell KE, Bauman A, Lee I. Does physical activity attenuate, or even eliminate, the detrimental association of sitting time with mortality? A harmonised meta-analysis of data from more than 1 million men and women. The Lancet 2016;388:1302-10. https://doi.org/10.1016/S0140-6736(16)30370-1

[23] Bhupathiraju SN, Tucker KL. Coronary heart disease prevention: Nutrients, foods, and dietary patterns. Clin Chim Acta 2011;412:1493-514. https://doi.org/10.1016/j.cca.2011.04.038

[24] CDC. Centers for Disease Control and Prevention. Adolescent and School Health. Adolescent connectedness has lasting effects. [Internet]. Atlanta, GA, US: Department of Health and Human Services 2017, p. 1.

[25] Handebo S, Kebede Y, Morankar SN. Does social connectedness influence risky sexual behaviours? Finding from Ethiopian youths. Int J Adolesc Youth 2017;23:1-14. https://doi.org/10.1080/02673843.2017.1306448

[26] Munsell EP, Kilmer RP, Cook JR, Reeve CL. The Effects of Caregiver Social Connections on Caregiver, Child, and Family Well-Being. Am J Orthopsychiatry 2013;82:137-45. https://doi.org/10.1111/j.1939-0025.2011.01129.x.The

[27] Stickley A, Koyanagi A, Koposov R, Schwab-Stone M, Ruchkin V. Loneliness and health risk behaviours among Russian and U.S. adolescents: A cross-sectional study. BMC Public Health 2014;14:1-12. https://doi.org/10.1186/1471-2458-14-366

[28] Varga S, Piko BF. Being lonely or using substances with friends? A cross-sectional study of Hungarian adolescents' health risk behaviours Health behavior, health promotion and society. BMC Public Health 2015;15:1-9. https://doi.org/10.1186/s12889-015-2474-y

[29] UNICEF. Adolescent Demographics. UNICEF DATA: Monitoring the situation of children and women. United Nations Children's Fund [Internet]. 2019; https://doi.org/https://data.unicef.org/topic/adolescents/demographics/

[30] NBS. National Bureau of Statistics. Annual Abstract of Statistics, 2011. Federal Republic of Nigeria 2011, pp. 1-697.

[31] USAID. United States Agency for International Development. President 's Malaria Initiative: Malaria Operational Plan FY 2019. Nation State Agency for International Development (USAID). 2019, pp. 1-79.

[32] Allen AA, Adekola PO. Combating infant mortalilty in Ibadan North Local Government Area, South West, Nigeria: need for sustainable development. J Sustain Dev Afr 2014;16:14-30.

[33] Adekola PO, Allen AA, Akintunde EA. Environmental factors affecting infant mortality in Ibadan North Local Government Area of Nigeria. Afr. J Soc Sci 2014;4:53-67.

[34] GSHS. Global school-based student health survey (GSHS) purpose and methodology: 2013 core questionnaire modules. World Health Organization, Department of Chronic Diseases and Health Promotion. 2013, pp. 1-16.

[35] Idowu A, Fatusi AO, Olajide FO. Clustering of behavioural risk factors for non-communicable diseases (NCDs) among rural-based adolescents in south-west Nigeria. Int J Adolesc Med Health 2016;30:1-9. https://doi.org/10.1515/ijamh-2016-0008

[36] Akanni OO, Koleoso ON, Olashore AA, Adayonfo EO, Osundina AF, Ayilara OO. Gender and other risk factors associated with risky behaviours among Nigerian adolescents. J Adolesc 2017;57:13-7. https://doi.org/10.1016/j.adolescence.2017.03.002

[37] Sangowawa AO, Adebiyi AO. Factors Associated With Sexual Abstinence Among Out-of-School Females in a Transitional Town in Oyo State, South-Western Nigeria. Health Care Women Int 2013;34:917-32. https://doi.org/10.1080/07399332.2013.769998

[38] Peltzer K, Pengpid S. Fruits and vegetables consumption and associated factors among in-school adolescents in seven African countries. Int J Public Health 2010;55:669-78. https://doi.org/10.1007/s00038-010-0194-8

[39] Slavin JL, Lloyd B. Health benefits of fruits and vegetables. Adv Nutr2012;3:506-16. https://doi.org/10.3945/an.112.002154.506

[40] Kjøllesdal M, Htet AS, Stigum H, Hla NY, Hlaing HH, Khaine EK, Khaing W, Khant AK, Khin Khin NO, Aye Mauk KK, Moe EE, Moe H, M KK, Mya KS, Myint CK, Myint CY, Myint O, New AA, Oo ES, Oo KS, Pyone ZZ, Soe YY, Wai MM, Win N, Bjertness E. Consumption of fruits and vegetables and associations with risk factors for non-communicable diseases in the Yangon region of Myanmar: a cross-sectional study. BMJ Open 2016;6:1-8. https://doi.org/10.1136/bmjopen-2016-011649

[41] Olugbenga-Bello AI, Adebimpe WO, Akande RO, Oke OS. Health risk behaviors and sexual initiation among in-school adolescents in rural communities in southwestern Nigeria. International Int J Adolesc Med Health 2014;26:503-10. https://doi.org/10.1515/ijamh-2013-0326

[42] Oyedeji GA. Socio economic and Cultural Background of Hospitalized Children in Ilesha. Nigerian Nig J Paediatr 1985;12:111-7.

[43] Ilori OR, Awodutire P, Ilori O. Awareness and utilization of adolescent reproductive health services among in-school adolescents in urban and rural communities in Oyo state. Niger Med J 2020;61:67-72.

[44] Azmawati MN, Hazariah, Siti Hamid A, Shamsul AS, Norfazilah A, Azimatun NA, Rozita H. Risk taking behaviour among urban and rural adolescents in two selected districts in Malaysia. S Afr Fam Pract 2015;57:160-5. https://doi.org/10.1080/20786190.2014.977048

[45] Omisore AG, Omisore B, Abioye-kuteyi EA, Bello IS, Olowookere SA. In-school adolescents' weight status and blood pressure profile in South-western Nigeria: urban-rural comparison. BMC Obesity 2018;5:1-9. https://doi.org/10.1186/s40608-018-0179-3

[46] Olayiwola F, Owagbemi OG. Strains in traditional family values in a Yoruba community: a study of families in Akoko-land in Ondo State, Nigeria. Eur Sci J 2012;8:160-71.

[47] Fentahun N, Mamo A. Risky sexual behaviors and associated factors among male and female students in Jimma Zone preparatory schools, South West Ethiopia: comparative study. Ethiop J Health Sci 2014;24:59-68. https://doi.org/10.4314/ejhs.v24i1.8

[48] Ameri Z, Mirzakhani F, Nabipour AR, Khanjani N, Sullman MJM. The Relationship Between Religion and Risky Behaviors Among Iranian University Students. J Relig Health 2017;56:2010-22. https://doi.org/10.1007/s10943-016-0337-1

[49] Hamid SH, Nawi AB. Family Characteristics Associate with Risk Taking Behaviour among Urban and Rural Adolescents in Two Districts in Selangor. A Comparative Study. Procedia Soc Behav Sci 2013;91:581-7. https://doi.org/10.1016/j.sbspro.2013.08.457

[50] Verdonk P, Seesing H, de Rijk A. Doing masculinity, not doing health? a qualitative study among dutch male employees about health beliefs and workplace physical activity. BMC Public Health 2010;10:712-26. https://doi.org/10.1186/1471-2458-10-712

[51] Cobey KD. Sex differences in risk taking behaviour among dutch cyclists. Evol Psychol 2013;11:350-64.

[52] Janssen HJ, Eichelsheim VI. Sex differences in longitudinal pathways from parenting to delinquency. Eur J Crim Pol Res 2017;23:503-21. https://doi.org/10.1007/s10610-017-9350-5

[53] Somefun OD. Religiosity and sexual abstinence among Nigerian youths: does parent religion matter? BMC Public Health 2019;19:416-27.

[54] Geczy I, Saewyc EM, Poon CS, Homma Y. Health-Risk Behaviors and Protective Factors among Adolescents in Rural British Columbia. J Rural Health 2019;00:1-12. https://doi.org/10.1111/jrh.12389

[55] Conry M, Morgan K, Curry P. The clustering of health behaviours in Ireland and their relationship with mental health, self-rated health and quality of life. BMC Public Health 2011;11:1-10.

Received on April 17, 2021. Accepted on June 3, 2021.

Correspondence: Akinwumi Oyewole Akindele, Department of Community Medicine, University College Hospital, PMB 5116, Ibadan, Nigeria – Tel. 2348067536303 - E-mail: akintent@yahoo.com.

How to cite this article: Akindele AO, Adebayo AM. Social connectedness and health risk behaviours among in-school adolescents in urban and rural areas of Oyo State, Nigeria. J Prev Med Hyg 2021;62:E689-E703. https://doi.org/10.15167/2421-4248/jpmh2021.62.3.2107