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Differential pattern of healthcare concerns and needs among adolescents across three developmental stages in south-west Nigeria

Babatunde Adelekan

adeshina.adelekan@bowen.edu.ng

Bowen University

Adesegun Fatusi

Obafemi Awolowo University

Olumide Owoeye

Bowen University

Temitope Ojo

Obafemi Awolowo University

Oluwaniyi Orisawayi

Obafemi Awolowo University Teaching Hospital Complex

Akinlolu Omisore

Osun State University

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Abstract

Background

Adolescence is a critical developmental period marked by rapid biological, psychological, and social changes. Evidence on how healthcare needs vary across adolescent stages in low- and middle-income countries including Nigeria remains limited. This study examined patterns of health concerns, healthcare needs, and unmet needs among adolescents in south-western Nigeria and explored differences across early, middle, and late adolescence .

Methods

A community-based cross-sectional survey was conducted among 1,004 adolescents aged 10–19 years selected through multistage sampling in urban and rural communities of Osun State. Data were collected using a structured interviewer-administered questionnaire adapted from validated adolescent health assessment tools. Descriptive statistics, chi-square tests, and logistic regression analyses were used to assess associations between developmental stage and healthcare needs.

Results

Overall, 77.0% of adolescents reported at least one health concern, while 72.2% reported a healthcare need. Physical health conditions and concerns related to secondary sexual characteristics were the most frequently reported health concerns. Significant differences were observed across developmental stages. Compared with early adolescents, middle adolescents (adjusted OR = 6.09, 95% CI: 4.22–8.80) and late adolescents (adjusted OR = 8.16, 95% CI: 4.79–13.92) were significantly more likely to report healthcare needs. Adolescents in senior secondary schools have about three times higher odds of reporting met health care needs compared to those in junior secondary school (aOR = 3.378; 95% CI:1.89–6.25). Among adolescents with a health condition requiring care, 62.5% reported unmet healthcare needs. Early adolescents experienced the highest proportion of unmet need (73.2%), compared with middle (57.5%) and late adolescents (57.6%) ($p < 0.001$). Female early adolescents had the highest prevalence of unmet healthcare needs.

Conclusion

Health concerns, healthcare needs, and unmet healthcare needs are common among adolescents in south-west Nigeria and vary substantially across developmental stages. Early adolescents, particularly girls, experience the greatest burden of unmet healthcare needs. These findings highlight the need for life-stage-responsive adolescent health programmes and strengthened adolescent-friendly health services that address the distinct needs of early, middle, and late adolescence. Improving access to age-appropriate, equitable, and responsive healthcare may contribute to better adolescent health outcomes and support progress towards universal health coverage..

BACKGROUND

Adolescence is the developmental transition period between childhood and adulthood. Although most cultures acknowledge and recognize this important developmental phase, there are substantial variations across cultural contexts regarding its duration, value, components, and defining features.[1] The adolescent period is characterised by profound physical, biological, social, behavioural, and emotional changes, including pubertal development, hormonal surges, and changes in physical appearance.[2] These changes influence adolescents' progression into adulthood and predispose them to various health challenges, such as acne, unhealthy weight gain or loss, and mental health

difficulties.[3] The World Health Organization (WHO) chronologically defines adolescents as persons aged 10–19 years.[4]The current generation of adolescents constitute the largest cohort in history, accounting for approximately 20% of the global population, with nearly 80% of them residing in low- and middle-income countries (LMICs).[5]

Adolescents in LMICs, particularly those in sub-Saharan Africa, experience disproportionately higher social, economic, and health challenges compared with their counterparts in high-income countries.[6] Mortality risk among adolescents and young people remains highest in sub-Saharan Africa, with death rates several times higher than those observed in high-income regions.[7] Recent estimates indicate that almost half of global adolescent deaths occur in sub-Saharan Africa.[8] These poor outcomes are largely the products of under-developed adolescent-responsive health systems and insufficient policy prioritisation of adolescent health needs.[9] As noted by Blum and colleagues, adolescent mortality is largely driven by preventable and behaviour-related causes, often exacerbated by weak health systems and policy failures.[10]

Investing in adolescent health yields a “triple dividend” of immediate benefits (benefit at the adolescent life stage), later and lifelong benefits (as adolescents grow into adulthood), and intergenerational benefits (as adolescents are the next generation of parents).[11] This provides a compelling rationale for prioritising adolescent health in sub-Saharan Africa.

A clear understanding of adolescents’ healthcare needs is fundamental to designing effective and responsive health services and interventions. WHO emphasises that countries must generate and monitor context-specific adolescent health data rather than relying solely on global or extrapolated evidence.[2,12] Improved understanding of adolescent health needs, combined with culturally grounded and evidence-based interventions, has the potential to significantly enhance health outcomes and societal development.[13]

The Lancet Commission on Adolescent Health and Well-Being classifies Nigeria as a high-burden country for adolescent health challenges.[11] With an estimated adolescent population exceeding 40 million, there is an urgent need to strengthen adolescent health programming in Nigeria using robust, evidence-informed approaches. Although several studies have explored adolescent health needs in Nigeria, the availability of disaggregated data that examines different adolescent life stages in community settings remains limited. This study focuses on this area of research gap; it seeks to assess and compare adolescent healthcare situations across different life stages in south-west Nigeria, with the aim of informing context-specific and evidence-based interventions.

METHODS

This cross-sectional study was conducted in Oriade Local Government Area (LGA) of Osun State, South-west Nigeria, which hosted the defunct Oriade Health and Demographic Surveillance Site (OHDSS). The OHDSS, which was established in 2008, covered the Oriade LGA, with a geographical area of 465 km2 and about 17 major towns, villages, and distinct communities. Ethical approval was obtained from Obafemi Awolowo University Teaching Hospital Complex Research and Ethics Committee prior to the commencement of the study. Permission to carry out the study was also obtained from Oriade Local Government Area and Osun State Ministries of Education and Health. Two urban communities (Ijebu-Ijesa and Ipetu-Ijesha) and two rural communities (Ikeji-Arakeji and Iloko-Ijesha) specifically constituted the study sites. The inhabitants of the four communities largely belong to the Yoruba ethnic group, which is the dominant indigenous tribe in south-west Nigeria. The study population comprised of adolescents aged 10–19 years who had lived in the study area for at least a year.

A minimum sample size of 500 per group was calculated for each of the rural and urban populations using PEPI software[14] sample size formula module for comparing independent proportions based on the following statistical parameter: statistical power of 80% and the prevalence of adolescents who had sought treatment for sexually

transmitted infections (STIs) (55% urban and 36% rural) obtained from a previous study.[15] A total of 1,004 adolescents were selected from the study areas through multistage sampling technique, At the onset, the communities in the LGA were classified into urban and rural category based on the official census classification used by National Population Commission, and which has used in several other population-based studies. [16–17] Two urban and two rural communities were selected from the list of rural or urban communities. Households with adolescents in the four communities were then selected using the OHDSS database, one adolescent selected per household to participate in the study. In households with more than one adolescent, we used simple random approach to select one adolescent.

Information was collected from study participants through a self-administered questionnaire. The study instruments covered socio-demographic factors, health problems experienced in the 12 months prior to the study using a selected lists of common conditions, informed primarily by the literature and supplemented by field-based experience of healthcare needs. Participation in the study was voluntary and confidentiality was assured. Parental consent was obtained before enrolling adolescents in the study as they are minors. Consent forms were given to the selected adolescents for their parents/guardians using an opt-out approach, the assent of each adolescent was subsequently obtained.

Measures

Adolescents were categorised into early (10–13 years), middle (14–16 years), and late (17–19 years) developmental stages. Parental socioeconomic status was derived from combined education and occupation scores based on the classification proposed by Oyedeji according tohis study of children in south-west Nigeria.[18] Information on health concerns over the past 12 months prior to the study was obtained from the respondents, across six main domains: pubertal issues and secondary sexual characteristics; physical health conditions; weight concerns; emotional problems; sexually transmitted infection (STI)/sexual and reproductive health (SRH) issues; and, substance use (Annex I). We also collected information on the adolescent health needs and the degree to which the needs were met. We defined “health concerns” as any condition that the adolescent considered to be troubling them, whether they consider such as worth seeking treatment or not. On the other hand, we defined “health care need” as those conditions that the adolescent consider serious enough to warrant seeking care from a health facility.

Data Analysis

Data were analysed using Stata software. Univariate analysis was used to describe respondents’ characteristics, health concerns and healthcare needs. Differences across the three stages of early (10–13 years), middle (14–16 years) and late (17–19 years) adolescence were examined using chi-square tests. Binary logistic regression was used to identify factors associated with unmet healthcare needs, with adjusted odds ratios (aORs) and 95% confidence intervals reported. Because age group and current educational class were likely to be related, we checked for multicollinearity using variance inflation factors (VIFs). We then fitted three logistic regression models, including age group and current educational class separately and together, while keeping the other covariates unchanged. The models were compared using Akaike’s Information Criterion (AIC). Both variables were retained in the final model because their VIFs were low and the model including both had the lowest AIC. Statistical significance was set at $p < 0.05$.

RESULTS

Socio-demographic characteristics

A total of 1,004 respondents participated in the study, consisting of 298 early adolescents aged

10–14 years (29.7%), 540 middle adolescents (53.8%), and 166 late adolescents (16.5%). The majority were females (53%), never married (99.3%), Christians (85.6%), and of Yoruba ethnic origin (90.9%) (Table 1). Most respondents were from monogamous family (83.0%), living with both parents (69.32%), and parents were of middle socio-economic level. The three adolescent categories (developmental stages) differed significantly in terms of sex distribution ($p = 0.046$), religion ($p < 0.001$), family structure ($p = 0.039$), paid work experience ($p < 0.001$), current educational level ($p < 0.001$) and family's socio-economic class. ($p < 0.001$).

Health related condition of concern in the past 12 Months

Overall pattern of health concerns The pattern of health concerns among males and females are similar with physical conditions having the highest proportion (Male:55.7%; Female:53.4%; Total:55.7%), followed by secondary sexual characteristics (Male: 43.8%; Female: 44.1; Total: 43.6%) (Table 2).

Table 1
Socio-demographic characteristics of the respondents by age group interval

Socio-demographic Characteristics	10–13 years (N = 298) n (%)	14–16 years (N = 540) n (%)	17–19 years (N = 166) n (%)	Total (N = 1004) n (%)	χ^2	df	P
Sex							
Male	126 (42.3)	256 (47.4)	90 (54.2)	472 (47.0)	6.1696	2	**0.046**
Female	172 (57.7)	284 (52.6)	76 (45.8)	532 (53.0)			
Marital Status							
Not married	298 (100.0)	535 (99.1)	164 (98.8)	997 (99.3)	5.0468	2	0.080
Married	0 (0)	5 (0.9)	2 (1.2)	7 (0.7)			
Religion							
Christianity	275 (92.3)	455 (84.3)	129 (77.7)	859 (85.6)	19.9131	2	**< 0.001**
Others	23 (7.7)	85 (15.7)	37 (22.3)	145 (14.4)			
Ethnicity							
Yoruba	269 (90.3)	493 (91.3)	151(91.0)	913 (91.0)	0.2463	2	0.884
Others	29 (9.7)	47 (8.7)	15 (9.0)	91 (9.0)			
Type of Family							
Monogamy	247 (82.9)	459 (85.0)	127 (76.5)	833 (83.0)	6.4846	2	**0.039**
Polygamy	51 (17.1)	81 (15.0)	39 (23.5)	171 (17.0)			
Whom the respondent is living with							
Both parents	210 (70.5)	381 (70.6)	105 (63.2)	696 (69.3)	4.5840	2	0.333
Single parent	45 (15.1)	85 (15.7)	28 (16.9)	158 (15.7)			
Others	43 (14.4)	74 (13.7)	33 (19.9)	150 (15.0)			
Ever received pay for Work							
Yes	12 (4.0)	39 (7.2)	22 (13.3)	73 (7.3)	13.4641	2	**< 0.001**

Socio-demographic Characteristics	10–13 years	14–16 years	17–19 years	Total	χ^2	df	P
	(N = 298) n (%)	(N = 540) n (%)	(N = 166) n (%)	(N = 1004) n (%)			
No	286 (96.0)	501 (92.8)	144 (86.7)	931 (92.7)			
Current Educational level							
Junior Secondary	245 (82.2)	228 (42.2)	20 (12.1)	493 (49.1)	232.1618	2	**< 0.001**
Senior Secondary	53 (17.8)	312 (57.8)	146 (87.9)	511 (50.9)			
Parents' Socioeconomic status							
Low	24 (8.0)	72 (13.3)	33 (19.9)	129 (12.9)	38.6479	4	**< 0.001**
Medium	148 (49.7)	313 (58.0)	104 (62.7)	565 (56.3)			
High	126 (42.3	155 (28.7)	29 (17.5)	29 (17.5)			

Among females, the third most common health concern is menstrual issues (35.9%), followed by STI/SRH (30.6%), while the third most common concern among males is STI/SRH. At least a fifth of males and females have one concern or the other, with the lowest proportiom for any health concerns being 23.4% for males (weight/stature) and 22.5% for females (substance abuse). Among adolescents aged 10–19 years as a whole, the males have marginal statistical significant higher level of concerns regarding substance abuse (25.3% vs. 22.5%, p = 0.05).

Table 2
Distribution of adolescents' health concern by sex

Health concerns	All adolescents (n = 1004)		Male (n = 472)		Female (n = 532)		p
	n	%	n	%	n	%	
Physical health condition	559	55.7	252	53.4	307	57.7	0.169
Secondary sexual characteristics	440	43.8	208	44.1	232	43.6	0.884
STI/SRH	300	29.9	145	30.7	155	29.1	0.584
Substance abuse	254	25.3	106	22.5	148	27.8	**0.051**
Emotional problem	254	25.3	118	25.0	136	25.6	0.837
Weight/stature problem	235	23.4	108	22.9	127	23.9	0.711
Menstrual problems					191	35.9	

However, there was no significant difference in prevalence between male and female adolescents aged 10–19 years regarding any of the other five categories of health concerns – physical health condition, secondary sexual characteristics, STI/SRH, emotional problem, and weight/stature problem.

Table 3 shows, there was no statistically significant differences regarding the proportion with health concerns between males and females in early adolescence (10–13 years) or late adolescence (17–19 years). However, among middle adolescents (age 14–16 years), the proportion of females with health concerns is significantly higher compared to males (75.4% vs 63.3%, $p = 0.002$). Among early adolescents, the proportion of females with health concern is significantly higher than males for weight/stature (48.8% vs 24.6%, $p < 0.001$), while males have a significantly higher proportion for emotional health concerns. (24.6% vs 13.4%, $p = 0.001$). Among middle adolescents (14–16 years), the proportion of females with health

Table 3
Distribution of health-related conditions of concern by age and sex

Health concerns	10-13yrs		10-13yrs Vs 14-16yrs	14-16yrs		14-16yrs Vs 17-19yrs	17-19yrs		17-19yrs Vs 10–13 yrs	The 3 age groups: χ^2;
	n	%	(p-value)	n	%	(p-value)	n	%	(p-value)	p-value
All conditions										
Male (M)	94	74.6		162	63.3		67	74.4		$\chi^2 = 8.862$
Female (F)	137	77.9		214	75.4		51	67.1		**p = 0.012**
M vs F: p-value	0.302			**0.002**			0.299			
All adolescents	231	77.5	**0.014**	376	69.6	0.721	118	71.1	0.124	
Physical conditions										$\chi^2 = 5.893$
Male	83	65.9		119	46.5		50	56.8		**p = 0.053**
Female	107	62.2		162	57.0		38	43.2		
M vs F: p-value	0.156			**0.014**			0.475			
All adolescents	190	63.8	**0.001**	281	52.0	0.826	88	53.0	**0.024**	
Pubertal concerns/ Secondary sexual characteristics										$\chi^2 = 10.436$ **p = 0.005**
Male	43	34.1		112	43.8		53	58.1		
Female	64	37.2		137	48.2		32	42.1		
M vs F: p-value	0.584			0.296			**0.031**			
All adolescents	107	35.9	**0.004**	249	46.1	0.250	85	51.2	**0.001**	
STIs/SRH issues										$\chi^2 = 8.734$
Male	37	29.4		74	28.9		34	37.8		**p = 0.013**
Female	63	36.6		69	24.3		23	30.3		
M vs F: p-value	0.190			0.225			0.310			
All adolescents	100	33.6	**0.031**	143	26.5	**0.049**	57	34.3	0.865	
Substance use										$\chi^2 = 7.499$ p = 0.024
Male	25	19.8		53	20.7		28	31.1		
Female	49	28.5		79	27.8		20	26.3		
M vs F: p-value	0.088			0.055			0.497			

Health concerns	10-13yrs		10-13yrs Vs 14-16yrs	14-16yrs		14-16yrs Vs 17-19yrs	17-19yrs		17-19yrs Vs 10–13 yrs	The 3 age groups: χ^2;
	n	%	(p-value)	n	%	(p-value)	n	%	(p-value)	p-value
All conditions										
All adolescents	74	24.8	0.697	132	24.4	0.248	48	28.9	0.338	
Emotional problem										$\chi^2 = 0.491$ p = 0.782
Male	31	24.6		65	25.4		22	24.4		
Female	23	13.4		41	14.4		12	15.8		
M vs F: p-value	**0.013**			**0.001**			0.169			
All adolescents	54	18.1	0.595	106	19.6	0.810	34	20.5	0.534	
Weight/stature										$\chi^2 = 1.783$ p = 0.410
Male	31	24.6		56	21.9		21	23.3		
Female	84	48.8		124	43.7		36	47.4		
M vs F: p-value	**< 0.001**			**< 0.001**			**0.001**			
All adolescents	125	42.0	**0.013**	180	33.3	0.811	57	34.3	0.108	
Menstrual problems										
Females	48	27.9	**0.023**	109	38.4	0.314	34	44.7	**0.009**	$\chi^2 = 1.783$ p = 0.410

concerns is significantly higher than males for physical conditions (57.6% vs 46.5, 0.014) and weight/stature (43.7% vs 21.9%, p < 0.001), while males have a significantly higher proportion for emotional health concerns. (25.4% vs 14.4%, p < 0.001). Among late adolescents (17–19 years), a significantly higher proportion of females had concerns with weight/stature compared to males (47.4% vs. 23.3%, p = 0.001), while a significantly higher proportion of males had concerns about secondary sexual characteristic (58.1% vs 42.1%, p = 0.031).

Health concerns across adolescent life stages

The proportion of adolescents who reported health concerns was significantly higher among early adolescents (10–13 years) compared to middle adolescents (14–16 years) for the following conditions: physical health (63.8% vs. 52.0, p = 0.001), STIs/SRH issues (33.6% vs 26.5%,p = 0.031), and weight/stature (42.0% vs. 33.3%, p = 0.0130) (Table 3). Also, compared to late adolescents, early adolescents have a significantly higher rate of concerns with physical conditions (63.8% vs 53.0%, p = 0.024).

On the other hand, significantly higher proportion of middle age adolescents compared to early adolescents expressed concerns about pubertal issues/development of secondary characteristics (46.1% vs 35.9%, p = 0.004). Also, a

significantly higher proportion of late adolescents have pubertal concerns compared to early adolescents (51.2% vs. 35.9%, p = 0.001). The proportion of late and middle adolescents with pubertal concerns/secondary sexual characteristics was, however, not significantly different (51.2% vs 46.1%, p = 0.250). Furthermore, a significantly higher proportion of late adolescents have concerns on STIs/SRH issues compared to middle adolescents (34.3 vs 26.5, p = 0.049), but the difference was not statistically significant in other groups.

Overall, health concerns was highest among early adolescents (77.5%), followed by late adolescents (71.1%), and least among middle adolescents (69.6%). The overall rate of health of concerns was significantly higher for early adolescents compared to middle adolescents (77.5% vs 69.6%, p = 0.014), but the difference in rates for early and late adolescents was not statistically significant (77.5% vs. 71.1%, p = 0.124). Among females, a significantly higher proportion of middle adolescents have menstrual concerns compared to early adolescents (38.4% vs 27.9%, p = 0.023). Similarly, a significantly higher proportion of late adolescents compared to early adolescents have menstrual concerns (44.7% vs. 27.9%, p = 0.009). However, there was no statistically significant difference between middle and late adolescents in terms of prevalence of menstriual problems (44.7% vs 38.4%, p = 0.314).

As Table 3 further shows, the general pattern that emerged among the adolescents is that concerns about physical conditions and weight/stature is highest in early adolescence and significantly higher than the rates in the older groups, while the figures for middle and late adolescents are about the same. On the other hand, concerns about pubertal issues/secondary sexual characteristics, emotional problems and menstrual concerns are lowest among early adolescents and increase by age to peak in late adolescents (Table 3). Concerns about STIs/SRH is highest among late adolescents and marginally but not significanly higher than the rate for early adolescents (34.3% versu 33.6%, p = 0.865), while the rate for middle adolescents is significantly lower than that of early adolescents (33.6% vs 26.5%, p = 0.031) and late adolescents (34.3% vs 26.5%, p = 0.049). There was no significant difference between the three age groups with respect to substance use, and between 26.3% and 28.5% reported concerns with substance use. There was also no significant difference between the sexes within each age group regarding substance use.

Health related needs by Age and Sex

Among the adolescents who reported a health condition requiring care, only 37.5% had their healthcare needs met, while 62.5% had unmet healthcare needs (Table 4). The proportion of adolescents with unmet healthcare needs differed significantly across the three age groups (p < 0.001), with early adolescents (10–13 years) recording the highest level of unmet needs (73.2%). The level of unmet needs among early adolescents (10–13 years) is significantly

Table 4
Healthcare met need and unmet need for healthcondition of concern across the life stages

Healthcare Needs											χ^2 (p value)
	10–13 years		**10–13 years vs 14–16 years**	**14–16 years**		**14–16 years vs 17–19 years**	**17–19 years**		**17–19 years vs 10–13 years**	**Total**	
	n	%		n	%		n	%		n	%	
A. Healthcare Need (All)												
Met	62	26.8		160	42.6		50	42.4		272	37.5	
Unmet	169	73.2		216	57.4		68	57.6		453	62.5	
Total	231		**< 0.001**	376		0.972	118		**0.003**	725		16.489 (**< 0.001**)
B. Unmet Healthcare need												
(i) Males												
Met	30	31.9		68	42.0		24	35.8		122	37.8	
Unmet	64	68.1		94	58.0		43	64.2		201	62.2	
Total	94		0.110	162		0.387	67		0.605	323		2.698 (0.259)
(ii) Females												
Met	32	23.4		92	43.0		26	51.0		150	37.3	
Unmet	105	76.6		122	57.0		25	49.0		252	62.7	
Total	137		**< 0.001**	214		0.302	51		**< 0.001**	402		18.429 (**< 0.001**)
(iii) All												
Male (M)	64	68.1		94	58.0		43	64.2		201	62.2	
Female (F)	105	76.6		122	57.0		25	49.0		252	62.7	
Total	169			216			68			453		
M vs F (p value)	0.149			0.844			0.099			0.899		12.761 (0.336)

higher compared to middle adolescents (73.2% vs. 57.4%, p < 0.001) as well as late adolescents (73.2% vs. 57.6%, p = 0.003), but the middle and late adolescents have a similar level of unmet need (57.4% vs 57.6%, p = 0.972).

Among the males, the level of unmet healthcare need was highest among early adolescents (68.1%) and lowest among middle (58.0%), but there was no significant difference between any of the groups. However, among the females, the highest unmet need was also among early adolescents (76.6%), but lowest among late adolescents (49.0%), with the level of unmet need significantly higher among early adolescents compared to both the middle adolescents (76.6% vs. 57.0%, p < 0.001) and the late adolescents (76.6% vs. 49.0%, p < 0.001). The level of unment healthcare needs for males and females is not significantly different on the whole (62.2% vs 62.7%, p = 0.336), and there was no significant sex difference for any of the three groups of adolescents although higher level of unment need among early adolescents and males have a higher level among late adolescents.

Determinants of healthcare needs among adolescents using logistic regression analysis

The multivariable analysis shows that age is significaly associated with met healthcare needs among adolescents. Late adolescents have eight (8) times higher odds (aOR = 7.689; 95% CI:2.637–22.416) and middle adolescents (14–16 years) have about six (6) times the odds (aOR = 5.992; 95% CI:2.586–13.883) of reporting met healthcare needs compared to early adolescents.

Current educational level of the adolescents was the only other variables significant in the multivariable analysis regarding met healthcare needs: adolescents in senior secondary schools have about three times higher odds of reporting met health care needs compared to those in junior secondary school (aOR = 3.378; 95% CI:1.89–6.25).

Table 5: Binary logistic regression analysis of determinants of unmet needs among adolescents

Socio-demographic Characteristics			Odd ratio	p-value (Confidence interval)
	Unadjusted Odds ratio		Adjusted Odds ratio	
Sex				
Male	Ref		Ref	
Female	1.063	0.81 (0.65–1.74)	1.269	0.36(0.76–2.12)
Religion				
Christianity	Ref		Ref	
Others	1.925	**0.03 (1.07–3.47)**	1.455	0.23(0.79–2.70)
Type of Family				
Monogamy	Ref		Ref	
Polygamy	1.232	0.44 (0.73–2.09)	0.933	0.81(0.54–1.62)
Age group interval				
10-13years (Early)	Ref		Ref	
14–16 years (Mid)	4.056	**0.01 (1.81–9.08)**	5.992	**< 0.01 (2.59–13.88)**
17–19 years(Late)	3.532	**0.01 (1.38–9.04)**	7.689	**< 0.01 (2.64–22.42)**
Ever received pay for Work				
Yes	Ref		Ref	
No	0.560	0.15 (0.26–1.22)	0.646	0.30 (0.29–1.46)
Current Educational level				
Junior Secondary	Ref		Ref	
Senior Secondary	2.132	**0.4 (1.27–3.57)**	3.378	**< 0.01 (1.89–6.25)**
Parents' Socioeconomic status				
Poor	Ref		Ref	
Medium	0.884	0.73 (0.44–1.77)	0.982	0.96 (0.48-2.00)
Rich	0.507	0.10 (0.22–1.15)	0.787	0.58 (0.34–1.85)

DISCUSSION

This study, conducted in southwest Nigeria, brings a more granular focus on adolescent health concerns and needs compared to the generality of existing literature by framing and contextualising these critical issues according to three choronological groups of adolescents – early (10–13 years), middle (14–16 years), and late adolescence (17–19 years). While there is no globally agreed chronological definition for adolescents, [19,20] the most common approach in the adolescent health field, based on the definition used by the Health Organization and other United Nations agencies, is to categorise the adolescence period into early (10–14 years), and late (15–19 years). Howerer, adolescence may be divided into three developmental stages based on physical, psychological and social changes .[21] Extant literature shows that the three stage classification provide more useful context in terms of adolescent systematic transition from

parental dependence to autonomy, and is often used to map the developmental task of adolescence.[22–23] This study shows a substantial burden of health concerns and healthcare needs among adolescents in south-west Nigeria, with similarities as well as variations in the prevalence and patterns across the three development stages and sex.

The study focused on the conditions recgonised as the most commong adolescent health globally, viz physical health, secondary sexual characteristics, sexual and reproductive health problems, substance use, emotional issues, and weight-related conditions.[24] These conditions are also priority national adolescent health issues in Nigeria, with the country classified by the Lancet Commission on Adolescent Health and Wellbeing as having a high burden of adolescent health problms, cutting across diseases of poverty, communicable diseases, and non-communicable diseases and injury.[25] The pattern of high prevalence reported in the study for most of the conditions reflects the complex, overlapping and multifaceted nature of adolescent health needs in the Nigerian setting, consistent with the evidence in extant literature on adolescent vulnerabilities in Nigeria and LMICs as a whole.[4,6,,26–29] The predominance of physical health concerns and concerns related to pubertal development and secondary sexual characteristics reflects the biological and psychosocial transitions that characterise adolescence. Similar patterns have been reported across sub-Saharan Africa, where physical symptoms, body image concerns, pubertal changes, and sexual and reproductive health issues consistently emerge as leading health concerns among adolescents.[27–28]

About three-quarters of adolescents reported at least one health concern requiring care within the past 12 months, and almost two-thirds (62.5%) had unmet healthcare needs. These unmet needs exceed prevalence levels reported in many other contexts, with reported rates between 15% to 25%.[29–30] High unmet need among adolescents is associated with increased risk behaviours and poorer short-term as well as long-term outcomes.[30] In Nigeria, factors such as inadequate number of adolescent-friendly services, stigma, and poor provider attitudes have been repeatedly identified as critical barriers to adolescents' access and utilisation of public sector facilities.[31–32] There is the need to urgently address these barriers to improve the availability of, and accesibility to adolescent-friendly health services.

The marked age-group differences in health concerns and healthcare needs across adolescent development stages as recorded in this study is important for prioritising health interventions and targeting the most needy group of adolescents. Our findings recorded the overall highest level of health concerns in early adolescents, whereas healthcare needs increases in middle and late adolescents. This finding suggests that while younger adolescents may experience multiple concerns, they often do not view these concerns as meriting seeking care. Part of the challenge in this respect may be associated with poor health literacy, which has been reported among adolescent and young people in Nigeria, particularly regarding SRH issues.[33–34] On the other hand, a higher proportion of older adolescents are more likely to perceive their health concerns as sufficiently serious to require professional healthcare services. Increased self-conciousness, health knowledge, and self-efficacy regarding access to health services may have contributed to the pattern observed among these older age groups. Similar age-related transitions in health needs have been documented globally, with evidence indicating that healthcare-seeking behaviour and perceived need for care often increase as adolescents acquire greater autonomy, health awareness, and decision-making capacity.[30,35]

The observed differences especially the elevated healthcare needs and unmet needs among mid-adolescents (14–16 years) align with developmental risk patterns documented in sub-Saharan Africa.[20] Middle adolescence is characterised by rapid biological and psychosocial changes, heightened social pressures, risk-taking, and evolving autonomy, which can increase health vulnerabilities without corresponding support systems.[10,20,30] In addition, African adolescents often face structural and sociocultural constraints that limit timely access to care, deepening unmet needs during this critical developmental period.[6]

Importantly, these findings demonstrate that adolescent health needs are not uniform across the 10–19-year age range chronologically provided by the World Health Organization for defining adolescence. Programmes that treat adolescents as a homogeneous population risk overlooking the distinct developmental realities of early, middle, and late adolescence. The findings therefore support increasing calls for life-stage-specific adolescent health programming, service delivery models, and health promotion interventions.[36–37]

The higher prevalence of health concerns among female adolescents, which is particularly related to physical health and reproductive health (including menstrual concerns) mirrors patterns reported in earlier studies across Nigeria and other African settings. [31–32,38] Substance use likewise remains an important adolescent health concern in Nigeria and Ethiopia, although available evidence generally reports higher levels of alcohol and other substance use among male adolescents than females.[39–40] Adolescent girls often face unique biological, social, and gender-related vulnerabilities that influence their healthcare needs and healthcare-seeking behaviour.[31,38–41] Research in Plateau State, Nigeria, highlighted poor uptake of sexual and reproductive health services among adolescents due to privacy concerns and provider attitudes, which disproportionately affect girls.[31] An earlier study in Osun State have also shown differential approaches to adolescent health needs and concerns, with female adolescents more disadvantaged. [42]

Females experience higher level of health concerns compared to males with regard to specific health concerns, including pubertal concerns, STIs, and emotional problems, among specific age groups. These findings agree with prvioulsy published works that suggest that females in sub-Saharan Africa have higher level of vulnerabilities, alongside lower level of access to adolescent health services and other forms of health care. Structural and gender-related factors relating to mobility within the community settings, social norms, emphasis on protecting/shielding the girl child, privacy concerns, and limited access to adolescent-responsive health services disproportionately affect girls. [31,38,41,43] Additionally, adolescent girls across sub-Saharan Africa experience significant unmet needs for modern contraception, contributing to teenage pregnancy and associated morbidities.[41] These patterns reinforce the perspective that that sex-specific factors intersect with developmental stage to shape health needs among adolescents. Conversely, male adolescents in some age groups and settings in sub-Saharan Africa have reported greater concerns related to secondary sexual characteristics and sexual infections, suggesting differing perceptions and priorities in health concerns between sexes. Enhanced understanding of these gendered patterns is critical for designing gender-sensitive responsive health services.

Developmental stages and education level emerged as significant determinants of healthcare needs. These findings further reinforce the need for age-sensitive approaches in adolescent health planning and programming. For optimal impact, healthcare responses and interventions need to recognise differential levels of health literacy, awareness of health problems, and ability to recognise conditions requiring professional care across the ages, in addition to biological factors. Education contributes to health literacy, confidence in navigating health systems, understanding of health risks, health-seeking behaviour, and utilisation of preventive health services which can reduce unmet needs.[43] Conversely, adolescents with lower education levels may lack the knowledge and agency to seek care effectively.

Studies across sub-Saharan Africa highlight pervasive barriers to health service utilisation among adolescents, including stigma, fear of judgement, lack of privacy, and provider attitudes, which discourage adolescents from seeking care even when services are available.[27,31,44] In Nigeria specifically, adolescents often avoid health facilities for sexual and reproductive health concerns due to perceived lack of confidentiality, negative provider attitudes, and absence of adolescent-friendly services.[31,45] Cultural taboos and social norms around adolescent sexuality further constrain utilisation of needed services.[45] These barriers help contextualise the high unmet healthcare need found in this study and suggest systemic gaps in service provision.

The findings of our study underscore an urgent need to strengthen adolescent-responsive health systems in Nigeria and other LMICs settings with similar socio-demographic and health systems contexts. Adolescents require services that are accessible, confidential, acceptable, equitable, and tailored to their developmental and sociocultural realities.[29,36] Strengthening provider competencies, improving confidentiality safeguards, integrating adolescent health into school health programmes, and expanding community-based and youth-friendly service platforms should be prioritised. This aligns with with Nigeria's national standard for adolescent health services[46] and WHO recommendations that adolescent health services be non-judgmental, integrated, and adolescent-centred.[4,12] Nigeria's renewed commitment to adolescent health within the framework of Universal Health Coverage prioritises multisectoral collaboration and adolescent engagement, offering a platform to address these identified gaps through national policy and implementation plans.[47–50]

Limitations

This study usesd a cross-sectional design, which limits causal inference regarding predictors of healthcare need. Secondly, data were self-reported and may be subject to recall or social desirability bias. Third, the study was conducted in a single local government area, which may limit generalisability to other regions. Finally, health concern categories were based on predefined lists and may not capture all locally relevant conditions. Despite these limitations, the use of community-based sampling and developmental stage stratification strengthens the validity and relevance of the findings.

CONCLUSION

This study demonstrates that health concerns, healthcare needs, and unmet healthcare needs are common among adolescents in south-west Nigeria and vary substantially across developmental stages and sex. While physical health conditions and concerns related to growth and body image were more prominent during early adolescence, concerns relating to pubertal development, sexual and reproductive health, and emotional wellbeing became increasingly important in later stages.

Although healthcare needs were more frequently reported among middle and late adolescents, unmet healthcare needs remained high across all age groups, particularly among early adolescents and female adolescents. These findings suggest that adolescent health needs are developmentally structured rather than uniformly distributed, reinforcing the importance of stage-specific intervention design rather than age-aggregated programming.

Strengthening adolescent-friendly services, improving school-based health education, and addressing structural and sociocultural barriers may enhance access to health care and improve adolescent health outcomes. Future adolescent health policies and programmes should incorporate developmental-stage considerations to ensure that interventions are appropriately targeted and responsive to the changing healthcare needs of adolescents across the life course.

Declarations

Ethics approval and consent to participate

Ethical approval was obtained from Obafemi Awolowo University Teaching Hospital Complex Research and Ethics Committee prior to commencement of the study. Permission to carry out the study was also obtained from Oriade Local Government Area and Osun State Ministries of Education and Health. Consent forms were given to the selected adolescents for their parents/guardians and subsequently the assent of each adolescent was obtained. The study was conducted in accordance with the Declaration of Helsinki.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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Author Contribution

ABA: Conceptualization, Methodology, Analysis, Writing – Original Draft, Writing – Review & Editing.

FAO: Conceptualization, Methodology, Review Analysis, Writing – Review & Editing.

OwO, OTO, OrO, OA: Review Analysis, Writing – Review & Editing.

All authors contributed to data interpretation, critically reviewed the manuscript for important intellectual content, approved the final manuscript, and accepted responsibility for the integrity and accuracy of the work.

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Data Availability

The data that support the findings of this study are not openly available due to reasons of sensitivity and are available from the corresponding author upon reasonable request.

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52. Parents Socio-economic. status Parent's socioeconomic status was generated from a score according to the level of occupation and education of the parents. The maximum possible score was 9 (9 = richest; 7–8 = richer; 5–6 = middle; 3–4 = poorer; 1–2 = poorest). Score 7–9 were further re-categorized as rich and 1–4 as poor.
53. Educational level Based on current. level at school categorized into Junior secondary school or Secondary School.
54. Health, Concerns.
55. *Physical health conditions*: Occurrence of dandruff, teeth problem, eye problem/vision, stomach pain, headache, injury, illness.
56. *Nervous/mental problems*: Occurrence of nervous or mental problem (moodiness, frequent crying, relationship issues with boys or girls;).
57. *Pubertal issues and secondary sexual characteristics*: Concerns with development of pimples/acnes and with size of reproductive organ.
58. *Weight/Stature issues*: Concerns with overweight, underweight, short or tall stature.
59. *sexually-transmitted infection (STIs) sexual and reproductive health (SRH) issues*: STI is based on history of frequent and/or painful urination; abnormal discharge from penis/vagina; SRH includes pregnancy and contraception issues.
60. Substance. *use*: Concerns with alcohol, smoking or taking of hard substances.