East African Scholars Journal of Medicine and Surgery
Abbreviated Key Title: EAS J Med Surg
ISSN: 2663-1857 (Print) & ISSN: 2663-7332 (Online)
Published By East African Scholars Publisher, Kenya

OPEN ACCESS

Volume-8 | Issue-2 | Feb-2026 | DOI: https://doi.org/10.36349/easjms.2026.v08i02.007

Original Research Article

Comparative Analysis of Sleep Quality among Adolescents in Urban and Semi-Urban Schools

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Article History
Received: 23.12.2025
Accepted: 19.02.2026
Published: 21.02.2026

Journal homepage:
https://www.easpublisher.com

Quick Response Code

Abstract: ***Background*:** Sleep is a complex phenomenon that plays a pivotal role in ensuring the optimal functioning of the body, especially in adolescence. Poor-quality sleep among adolescents is a major public health problem and the subject of numerous studies in other parts of the world; however, it remains relatively underexplored in our context. This study aimed to assess sleep quality among adolescents attending schools in urban and semi-urban areas. ***Methods***: This descriptive and analytical cross-sectional study was conducted over seven months. We included all voluntary adolescents aged 10–19 years who had given their written informed consent or that of their legal guardian(s). Our sampling was convenient and consecutive. Data on socio-demographic features and lifestyle were collected, and we used the Pittsburgh Sleep Quality Index, Epworth Sleepiness Scale, and Hospital Anxiety and Depression Scale to assess each participant. Univariate and multivariate analyses were performed to identify factors associated with sleep quality. $P < 0.05$ was considered statistically significant. ***Results*:** A total of 952 were selected, including 309 in semi-urban areas and 643 in urban areas. The mean age of the population was 16.33 ± 1.70 years, with 52.0% female participation. Drug consumption was found in 25.3% of participants, and psychoactive substance consumption in 49.9% of participants, with the rates of consumption of these substances being significantly higher in urban areas than in semi-urban areas. Sleep quality was poor in 41.0% of students, 46.3% in urban areas, and 29.3% in semi-urban areas, the prevalence of sleep quality being significantly higher in urban areas ($p < 0.001$). Insomnia, which was identified in 19.4% of study participants, was the most common sleep disorder in our study population. Independent risk factors for poor sleep quality among students included living in urban areas, age between 17 and 19 years, the female sex, being in the first or last year of school, drug use, anxiety, and depression. ***Conclusion*:** The prevalence of poor sleep quality is high among Cameroonian adolescents, particularly in urban areas, and insomnia is the most common among them. These disorders have many risk factors, most of which are lifestyle-related.

Keywords: Sleep, Adolescence, Sleep Quality, Associated Factors.

INTRODUCTION

Sleep is defined as a reversible behavioral state of perceptual disengagement and insensitivity to the environment [1]. It is a state of unconsciousness in which, unlike a coma, the individual can be awakened by a sensory (or other) stimulus [2]. It is essential for the optimal functioning of the body because it is the seat of physiological reactions in the nervous system and other systems [2]. Sleep disorders constitute a real public health problem, particularly in adolescents, where there are profound changes in the structure of sleep such as the decrease in deep slow-wave sleep and an evolution of the circadian rhythm, with a tendency toward phase delay [3]. So, in 2017, in a study conducted among high school students in South Finistère in France, Perdereau *et al*., found a 73% prevalence of sleep disorders [4]. Meanwhile, Ayeh *et al*., found a prevalence of 31.9% of sleep disorders in adolescents, in a study conducted in Kerman, Iran, in 2019 [5]. In China, in 2021, a study by

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Liang *et al*., found a 26% prevalence of sleep disorders in adolescents. In Cameroon, a study conducted in 2019 by Kamdem *et al.,* found a prevalence of poor sleep quality of 40.3% in urban areas and 41% in semi-urban areas [6]. Sleep-deprived adolescents tend to be drowsy and face many difficulties associated with the condition, including lower school performance [5], mood disturbances, increased risk of motor vehicle accidents, drug and alcohol abuse, weight gain, and obesity [3]. Similarly, an association between sleep deprivation and violence has been established in adolescents [7]. Sleep is influenced by several factors, including biological, socio-demographic, and environmental factors [8], that are lifestyle-related. Particularly, the preponderance of new information and communication technology and the consumption of psychoactive substances and stimulants, which are the prerogative of young people, negatively affect sleep nowadays [9–11]. Therefore, we conducted this study to evaluate the quality of sleep in adolescents living in urban and semi-urban areas in Cameroon.

METHODS

Study Design and Setting

This analytical cross-sectional study was conducted in secondary schools in urban and semi-urban areas from November 2022 to May 2023. The schools were selected on a convenience basis to ensure that all types of secondary institutions in the country were represented. At the end of the consecutive and convenience sampling, six establishments were chosen; three in urban areas (Lycée Bilingue d'Essos, Collège Privé Don Bosco, and Collège Privé Montesqieu) and the other three in semi-urban areas (Baham Technical High School, Baham Bilingual High Schools, and Bameka Technical High School for semi-urban areas).

Study Population and Ethical Clearance

We included students whose consent, or that of at least one parent or guardian, was obtained before the start of the study and excluded students who provided incomplete information. Prior to this, we obtained ethical clearance from the Institutional Review Board (IRB) of the Faculty of Medicine and Biomedical Sciences of the University of Yaoundé I and authorization from the various Delegations of Secondary Education in the Regions concerned. We also obtained the written approval of the heads of the different secondary schools involved.

Procedure

Before data collection, we had an educational exchange with the students on sleep and the factors affecting it. During this exchange, we also got to present to them the objectives, procedures, risks, and benefits of our study. Consenting students were then assembled in classrooms under the supervision of a guidance counselor, and/or a supervisor, and/or a teacher who ensured compliance with confidentiality and made up for difficulties in the event of misunderstanding of a question.

Variables

Data were collected using the Pittsburgh Sleep Quality Index (PSQI), Epworth Sleepiness Scale (ESS), Hospital Anxiety and Depression Scale (HADS) score for anxiety and depression, and a pre-established questionnaire including questions on socio-demographic features, lifestyle (age, sex, level of study, region of origin, nationality, religion, school level, extracurricular activity, use of smartphone or laptop), and personal history (asthma, sickle cell disease, epilepsy, HIV, diabetes, consumption of psychoactive substances). The Pittsburgh Sleep Quality Index (PSQI) was used to assess students' subjective sleep quality. The PSQI is a questionnaire composed of 19 self-assessment questions grouped into the following seven components: subjective sleep quality, sleep latency, sleep duration, usual sleep efficiency, sleep disorders, use of sleep medication, and poor daytime form. Each component received a score of 0–3, and the individual scores added up to a total of 0–21. The participants are then classified into two groups: good quality of sleep (an overall score of ≤5) and poor quality of sleep (an overall score of >5). Pittsburgh Sleep Quality Index (PSQI) [12].

The Epworth Sleepiness Scale (ESS), which was used to assess the degree of daytime sleepiness, includes eight items each rated from 0 to 3, for a final score of 24 [13].

- A score of 0–8 reflects normal sleep
- A score of 9–14 reflects moderate sleepiness
- A score of ≥15 reflects excessive sleepiness

The Hospital Anxiety and Depression Scale (HADS Score) was used to assess anxiety and depression [14] . This scale is used in screening for anxiety and depressive disorders, and it includes 14 items that are graded from 0 to 3. Seven questions relate to anxiety, while the other seven relate to the depressive dimension. For each of these dimensions:

- A score of ≤7 reflects an absence of symptoms
- A score of 8–10 reflects a doubtful clinical presentation
- A score of ≥11 reflects the presence of clinical manifestations with certainty

Statistical Analysis

The data were processed and analyzed using SPSS version 23. The quantitative variables are presented as the mean ± standard deviation (SD), while qualitative variables are presented as counts and percentages. Data were compared between urban and semi-urban areas using Student's t-test for quantitative variables and the chi-square test for qualitative variables. The factors associated with poor sleep quality were determined using univariate and multivariate logistic regression analyses. Variables with $p < 0.05$ in the univariate analysis were included in the multivariate regression model.

RESULTS

Sociodemographic and Professional Characteristics of the Population

We included 952 participants, with 643 of them living in urban areas and 309 in semi-urban areas. The mean age of the students was 16.33 ± 1.70 years, and 52.2% of them were females. The mean age was higher in semi-urban areas (16.75 ± 1.73) than urban area (16.13 ± 1.66). Students in form five were the most represented (32.6%), the most common after-school activities were trading and follow-up lessons. The sociodemographic characteristics of our study participants are presented in Table 1.

Table 1: Sociodemographic characteristics of the study population

Variables	Urban	Semi-urban	Total
	N = 643; n (%)	N = 309; n (%)	N = 952; n (%)
Age groups (years)			
10–13	24 (3.7)	3 (1.0)	27 (2.8)
14–16	371 (57.7)	137 (44.3)	508 (53.4)
17–19	248 (38.6)	169 (54.7)	417 (43.8)
Sex			
Male	304 (47.3)	153 (49.5)	457 (48.0)
Feminine	339 (52.7)	156 (50.5)	495 (52.0)
Classes			
Form 4	128 (19.9)	125 (40.5)	253 (26.6)
Form 5	242 (37.6)	68 (22.0)	310 (32.6)
Lower sixth	100 (15.6)	3 (1.0)	103 (10.8)
Upper sixth	173 (26.9)	113 (36.6)	286 (30.0)
After school activities			
Trading	51 (7.9)	88 (28.5)	139 (14.6)
Rehearsal lessons	262 (40.7)	120 (38.8)	382 (40.1)
None of both	330 (51.3)	101 (32.6)	431 (45.2)

Lifestyle

Approximately 25.3% of our study participants were engaged in drug abuse, and in 21.6% of cases, the drugs of abuse were legal products. Approximately 21.5% of our study participants were alcohol consumers, and there were significantly more alcohol consumers in semi-urban areas than in urban areas. Approximately 21.5% of our study participants consumed shisha, and there were significantly more shisha consumers in urban areas than in semi-urban areas. The rate of consumption of stimulants (caffeine and energy drinks) in this study was 49.9%, and the rate in urban areas was significantly higher than that in semi-urban areas. The overall rates of mobile phone and laptop computer use were 70.4% and 28.9%, respectively, with both rates being significantly higher in urban areas than in semi-urban areas ($p<0.001$). The lifestyle details of our study participants are presented in Table 2.

Table 2: Distribution of the study population according to lifestyle

Variables	Urban	Semi-urban	Total	p-value
	N = 643; n (%)	N = 309; n (%)	N = 952; n (%)	
Drug use	**158 (24.6)**	**83 (26.9)**	**241 (25.3)**	0.247
Legal drugs	126 (19.6)	80 (25.9)	206 (21.6)	**0.018**
Illegal drugs	99 (15.4)	17 (5.5)	116 (12.2)	**< 0.001**
Legal drugs				
Alcohol	125 (19.4)	80 (25.9)	205 (21.5)	**0.015**
Tobacco	11 (1.7)	1 (0.3)	12 (1.3)	0.060
Illegal drugs				
shisha	92 (14.3)	15 (4.9)	107 (11.2)	**< 0.001**
Tramadol	6 (0.9)	0 (0.0)	6 (0.6)	0.094
Diazepam	1 (0.2)	0 (0.0)	1 (0.1)	0.675
Ecstasy	14 (2.2)	2 (0.6)	16 (1.7)	0.067
Cocaine	9 (1.4)	2 (0.6)	11 (1.2)	0.252
Consumption of stimulants	**338 (52.6)**	**137 (44.3)**	**475 (49.9)**	**0.010**
Caffeine	255 (39.7)	114 (36.9)	369 (38.8)	0.227
Energy drinks	216 (33.6)	77 (24.9	293 (30.8)	**0.004**
NTIC				
Cellphone	455 (70.8)	215 (69.6)	670 (70.4)	**< 0.001**
Laptop	211 (32.8)	64 (20.7)	275 (28.9)	**< 0.001**

Sleep Quality

Sleep quality was poor (PSQI score >5) in 41.0% of students in the overall population; i.e., 390 participants, 298 in urban areas and 91 in semi-urban areas, with the prevalence of poor sleep quality being significantly higher in urban areas than in semi-urban areas (p <0.001). Insomnia was the most common sleep disorder (19.4%), followed by excessive sleepiness (15.5%). The rates of insomnia and sleepiness were significantly higher in urban areas (23.8% and 18.4%, respectively; p <0.001). The distribution of the study population according to sleep quality and sleep disorders is presented in Table 3.

Table 3: Distribution of the study population according to sleep quality and sleep troubles

Variable	Urban areas (%)	Semi-urban areas (%)	Total (%)	P-value
Sleep quality				
Good	345 (53.7)	218 (70.7)	563 (59)	**<0.001**
Poor	298 (46.3)	91 (29.3)	389 (41)	
Sleep troubles				
Insomnia				
Yes	153 (23.8)	32 (10.4)	185 (19.4)	
No	490 (76.2)	277 (89.6)	767 (80.6)	**< 0.001**
Excessive sleepiness				
Yes	118 (18.4)	30 (9.7)	148 (15.5)	**< 0.001**
No	525 (81.6)	279 (90.3)	804 (84.5)	
Moderate drowsiness				
Yes	332 (51.6)	156 (50.5)	488 (51.3)	0.64
No	311 (48.4)	153 (49.5)	464 (48.7)	

Factors Associated with Poor Sleep Quality

There were no significant associations between residence in a semi-urban area, the male sex, and extracurricular business-type activities and poor sleep quality. Through our univariate analyses, we found statistically significant associations between poor sleep quality and residence in an urban area, the female sex, the 14–19-year age group, taking refresher courses, drug consumption, caffeine use, the use of smartphones and computers, and anxiety and depression (p **< 0.05)**. After performing a multivariate logistic regression analysis, we found that only residence in an urban areas, the 17–19-year age group, the female sex, being in form five or upper sixth (classes with end-of-course examinations), taking refresher courses, legal drug consumption, and anxiety and certain depression were the independent risk factors for poor sleep quality in the study population (ORa > 1; adjusted p < 0.05). The factors associated with poor sleep quality are presented in Table 4.

Table 4: Factors associated with poor sleep quality in the study population. Univariate analysis

Variables	Poor sleep quality		OR (IC à 95%)	P-value
	Yes=390; n(%)	No=562; n(%)		
Residence area				
Urban	298 (46,3)	345 (53,7)	2,03 (1,52-2,72)	**< 0,001**
Semi-urban	92 (29,8)	217 (70,2)	1	
Age groups (year)				
10-13	5 (18,5)	22 (81,5)	0,31 (0,12-0,84)	0,011
14-16	177 (34,8)	331 (65,2)	0,58 (0,44-0,75)	< 0,001
17-19	208 (49,9)	209 (50,1)	1,93 (1,48-2,50)	**< 0,001**
Sexe				
Male	158 (34,6)	299 (65,4)	0,59 (0,46-0,77)	
Female	232 (46,9)	263 (53,1)	1,66 (1,28-2,16)	**< 0,001**
Classes				
Form 4	81 (32,0)	172 (68,0)	0,59 (0,43-0,80)	**< 0,001**
Form 5	96 (31,0)	214 (69,0)	0,53 (0,39-0,70)	**< 0,001**
Lower sixth	67 (65,0)	36 (35,0)	3,03 (1,97-4,65)	**< 0,001**
Upper sixth	146 (51,0)	140 (49,0)	1,80 (1,36-2,38)	**< 0,001**
Drug use				
Legal drugs	108 (52,4)	98 (47,6)	1,81 (1,32-2,47)	**< 0,001**
Illegal drugs	63 (54,3)	53 (45,7)	1,85 (1,25-2,73)	**< 0,001**
Consumption of stimulants	218 (45,9)	257 (54,1)	1,50 (1,60-1,95)	**0,001**

Variables	Poor sleep quality		OR (IC à 95%)	P-value
	Yes=390; n(%)	No=562; n(%)		
After school activities				
Trading	52 (37,4)	87 (62,6)	0,84 (0,58-1,21)	0,204
Rehearsal lessons	180 (47,1)	202 (52,9)	1,52 (1,17-1,98)	**0,001**
NTIC				
Cellphone	289 (43,1)	381 (56,9)	1,35 (1,02-1,81)	0,021
Laptop	125 (45,5)	150 (54,5)	1,29 (0,97-1,72)	0,043
Anxiety scale				
Absence d'anxiété	88 (29,4)	211 (70,6)	**0,48 (0,36-0,64)**	**< 0,001**
Anxiété douteuse	102 (36,8)	175 (63,2)	0,78 (0,58-1,04)	0,055
Surely anxiety	200 (53,2)	176 (46,8)	**2,30 (1,76-3,01)**	**< 0,001**
Depression scale				
Absence de dépression	227 (38,3)	366 (61,7)	**0,74 (0,57-0,97)**	**0,018**
Dépression douteuse	105 (42,7)	141 (57,3)	1,100 (0,82-1,47)	0,287
Surely depression	58 (51,3)	55 (48,7)	**1,61 (1,08-2,38)**	**0,012**

Table 5: Factors associated with poor sleep quality in the study population, Multivariate analysis

Variables	Poor sleep quality		OR (IC à 95%)	P-value
	Yes=390 ; n(%)	No=562; n(%)		
Résidence area				
Urban	298 (46,3)	345 (53,7)	**1,79 (1,26-2,55)**	**0,001**
Age groups				
17-19	208 (49,9)	209 (50,1)	**1,65 (1,10-2,45)**	**0,015**
Sexe				
Female	232 (46,9)	263 (53,1)	**1,49 (1,09-2,04)**	**0,011**
Classe				
Lower sixth	67 (65,0)	36 (35,0)	**2,30 (1,36-3,88)**	**0,002**
Upper sixth	146 (51,0)	140 (49,0)	**1,53 (1,01-2,36)**	**0,048**
Drug use				
Legal drugs	108 (52,4)	98 (47,6)	**1,52 (1,01-2,32)**	**0,048**
Illegal drugs	63 (54,3)	53 (45,7)	0,94 (0,56-1,56)	0,813
Consumption of stimulants	218 (45,9)	257 (54,1)	1,26 (0,93-1,71)	0,132
After school activities				
Trading	180 (47,1)	202 (52,9)	**1,35 (1,01-1,84)**	**0,049**
Rehearsal lessons				
NTIC	289 (43,1)	381 (56,9)	1,01 (0,71-1,43)	0,928
Cellphone	125 (45,5)	150 (54,5)	1,25 (0,90-1,73)	0,172
Anxiety				
Surely anxiety	200 (53,2)	176 (46,8)	**1,93 (1,41-2,65)**	**< 0,001**
Depression				
Surely depression	58 (51,3)	55 (48,7)	**1,80 (1,14-2,84)**	**0,011**

DISCUSSION

In this study, we aimed to assess sleep quality among adolescents attending schools in urban and semi-urban areas and identify factors associated with poor sleep quality in this population. The mean age of our study participants was 16.33 ± 1.70 years, with the students in semi-urban areas being significantly older than those in urban areas. These results are similar to those reported by Kamdem *et al*., in 2019, who found that participants in semi-urban areas were significantly older than those in urban areas. This finding can be explained by the fact that people in semi-urban areas generally go to school at more advanced ages and have poorer academic performance (which means they will repeat a few classes and spend more time going through school) than those in urban areas [6-15]. This mean age of the entire study population is also near to that reported by Bailey *et al*., (15 years) in 2004 [16]. That similarity can be due to the age range in their study, which was near to ours, either 13 to 19 years old. In our study population, there were more females than males, which is similar to the findings of Royant-*et al*., who reported that 62.4% of their study participants were females [17] . This is probably a direct reflection of Cameroon's demographic structure in which there are more females than males, according to the report of the National Institute of Statistics (2015 edition) [6]. About 25.3% of our study participants consumed drugs, the most common of which were alcohol (21.5%) and shisha (11.2%). This prevalence of drug use is near to the 31% found by

Mohale and Mokwena in Johannesburg [18], this similarity can be explained by the fact that shisha is the most common way of taking tobacco by teenagers nowadays [19, 20]. The rate of stimulant consumption in our study population was 49.9%, and the rate was significantly higher in urban areas than in semi-urban areas. Caffeine (38.8%) was the most commonly consumed stimulant. This can be explained by the fact that in urban areas, students are more inclined to consume caffeine to help them work more and improve their academic performance. The rates of ownership of smartphones and laptops were 70.4% and 28.9%, respectively, with the values in urban areas being significantly higher than those in rural areas. This finding differs from that of Kracht *et al*., in 2020 (32%). This disparity can be explained by the fact that the mean age of their population was 12 ± 1.9 years but that in our study was 16.33 ± 1.70 years, and parents/guardians are more likely to buy smartphones for adolescents than for juveniles [21] . As technology continues to advance, electronic devices are increasingly popularized and made more accessible to the public at cheaper rates, which means more and more parents/guardians can afford to buy them for their children. Also, since the amount of educative content on social media platforms such as YouTube is constantly increasing, more parents are encouraged to buy these gadgets for their children to enable them to enhance their school performance.

Sleep quality was poor in 41.0% of our study participants, and the prevalence of poor sleep quality in urban areas (46.3%) was significantly higher than that in semi-urban areas (29.3%)**.** This is in contrast with the findings of Kamdem *et al*., who reported a 41% prevalence of poor sleep quality in their study population in 2019 [6], with the prevalence being higher in semi-urban (41.7%) than in urban (40.3%) areas. This difference could be explained by the fact that students in semi-urban areas are generally older and more engaged in income-generating and extracurricular activities due to the relatively lesser parental censorship, which exposes them more to social and emotional problems that are not school-related and takes a toll on their sleep quality [22] . Another study conducted in 2019 by Shamsadini *et al*., found a lower prevalence of poor sleep quality (31.9%) than we did in this study. This difference can be explained by the fact that they worked on younger participants (average age: 14.72 years) and in a relatively more developed country (Iran) where people are generally more informed of the importance of proper sleep [5] .

In this study, 46.3% of our participants had poor sleep quality, with insomnia (19.4%) and excessive sleepiness (15.5%) being the most common disorders. This result ties in with that of Bailly *et al*., who reported that 35.7% of the adolescents in their study had persistent insomnia-type sleep disorders [16] . Also, the higher rates of insomnia and drowsiness in urban areas than in semi-urban areas can be explained by not only the higher rate of use of electronic devices but also the constant sound pollution that is characteristic of urban areas.

Students aged 17–19 years and females had a significantly greater risk of having poor sleep quality. This is similar to the findings of Bailly *et al*., according to which more advanced puberty and the female sex were significant risk factors for poor sleep quality. Furthermore, Aalouane *et al*., reported somnolence in 17.6% of girls and 12.8% of boys after a survey conducted in Morocco [23], while Julian *et al*., found that the female sex was associated with insomnia-type sleep disorder [24], further proving that the female sex is a risk factor for poor sleep quality. Students in the first year or final year of secondary school were more predisposed to experiencing poor sleep quality, a finding which is similar to that of Liang *et al*., in China, who reported that adolescents in higher grades were more likely to develop sleep disorders [25]. This can be explained by the fact that students in higher classes are generally older than their younger counterparts, and age itself is a risk factor for poor sleep quality. In addition, academic demands increase for students in higher classes, which takes a toll on their sleep time and sleep quality. We also identified an association between drug use and poor sleep quality, a finding that is comparable to that of Perdereau *et al*., who found a correlation between the consumption of psychoactive substances and poor sleep quality [26]. This result can be related to the fact that psychoactives substances which can be addictive, can induce sleep disorders [27]. Anxiety and depression were significantly associated with poor sleep quality, which is in line with the findings of Faith Orchard *et al*., in 2020, who reported that adolescents with anxiety and depression also present problems with sleep quality [28]. Furthermore, Julian *et al*., found that anxiety and depression were factors associated with insomnia-type sleep disorder [24].

In conclusion, we found that 46.3% of adolescents in secondary schools in Cameroon had poor sleep quality, the main sleep disorder in this population is insomnia, and the major factors associated with poor sleep quality are the female sex, residence in urban areas, older age, higher classes, drug use, and anxiety and depression.

Nevertheless, our study had some limitations. First, the convenience sample we used was not representative of the population of Cameroonian secondary school students, which means our results cannot be generalized. Next, our study sample was relatively small for a study of this magnitude, which also limits the validity of our findings. Furthermore, the tools to assess sleep and its disorders were purely subjective. The use of objective methods such as actigraphy or polysomnography would have been ideal but we did not have the necessary resources to conduct such sophisticated tests. Therefore, we recommend that more nationally representative, large-scale studies that involve

the use of objective assessments of sleep quality should be conducted in the future to further investigate our findings.

DECLARATIONS

Acknowledgments: We thank all the academic institutions and students who willfully participated in this study.

Conflicts of Interest: The authors have no conflict of interest to declare

Contribution of the Authors

L. Ngarka, and A. F. Tchuenkam conceived the research idea and contributed to the study design, data collection and entry, interpretation of results, cleaned, analysed the study data and write-up of the initial manuscript. A. K. Njamnshi and F. E. Ntone supervised the research project, contributed to the interpretation of results and manuscript writing. All authors contributed to the revision of the initial manuscript, approved the final version to be published, and agreed to be accountable for all aspects of the work.

Ethical Approval and Consent

The authors certify that all procedures employed for the elaboration of this work comply with the standards of the competent national and institutional committees on human experimentation and with the declaration of Helsinki of 1975 revised in 2008. All I procedure has been approved by the Institutional Ethics and Research Committee (CIER) of the Faculty of Medicine and Biomedical Sciences of the University of Yaoundé I (Ref: N°188/UYI/FMSB/ VDRC/DAASR/CSD on 12/05 /2023). Participation was voluntary and those recruited gave their consent or that of their guardians. The authorizations were obtained from the regional delegations of secondary education and from the heads of establishments. The questionnaires were completed anonymously and the data was analyzed confidentially.

Funding: The authors did not receive any funding for this study.

Data Availability: The data presented in this article are freely available from the corresponding author upon reasonable request.

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Cite This Article: Ngarka Leonard, Tchuenkam M Andréa Finesse, Njit Edith N, Tcheutchoua Foka Kathy, Ntone E. Felicien, Njamnshi K. Alfred (2026). Comparative Analysis of Sleep Quality among Adolescents in Urban and Semi-Urban Schools. *East African Scholars J Med Surg, 8*(2), 83-90.