Published by The College of Science & Information Technology (COSIT), TASUED, Vol. 18, No. 2, pp. 104-114.

COSIT, TASUED
Journal of Science and Information Technology (JOSIT)

A Non-invasive Technique for Sleep Quality Appraisal among Adults in Developing Countries: A Case Study of Southwestern Nigeria

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Abstract

Access to cost effective tools that are readily available to evaluate sleep quality seems challenging whereas several self-reported questionnaires have been developed and found useful in this regards due to their low cost, their ability to be administered easily (online or in person to a variety of populations), and their explicitness. Monitoring sleep patterns and its related factors are essential and important to healthy living but there is little knowledge about the importance of sleep especially in many developing countries. Individuals still complain about not getting enough sleep at night even when they have the opportunity. This study developed a sleep questionnaire "SSQ3[26]" (subjective sleep quality, on 3 categories, and 26 items) and compared it with existing self-reported questionnaires using a cross-sectional survey on a total 207 respondents. The outcome of the study recorded a Cronbach alpha coefficient of 0.735 with a validity of sensitivity 80.6% and specificity of 78.7%. The questionnaire was able to validate effect of ageing on sleep quality, nature of work on sleep quality which was in tandem with the positions of sleep literature that as we age, quality sleeps decreases. Likewise the result of the study showed that only 49.27% of the total population enjoyed 6 hours of sleep which shows that, there is critical gap in quality sleep been enjoyed. In conclusion, the questionnaire was able to give useful and reliable information about sleep quality appraisal from the study population and related matrices necessary for design considerations and research purposes.

Keywords: Sleep-quality, Sleep monitoring, Sleep-questionnaire, Cost-effectiveness, Ageing.

INTRODUCTION

Sleep monitoring techniques and estimation continue to undergo different reviews and development to critically understand and control factors that support sleep quality and yet to be identified habits that are associated with sleep disturbances. There are several different presentations which involve a variety of physiological, emotional, and behavioral abnormalities especially sleep–wake disorder, and some dysfunctions associated with sleep stages, or partial arousal, these are majorly classified as sleep disturbances (Cormier, 2019). Sleep related problems remain major concerns among human race where a considerable number of the world populations are struggling to get good sleep. Understanding sleep patterns and related factors is very important however, there is little knowledge about the importance of sleep especially in many developing countries (Folusho *et al.*, 2017). There are potentially lives threatening concerns should sleep disorder be left unattended, inflammation, stress,

Cite as:

Odumosu O.O.; Ismaila S.O.; Kuye S.I.; Folorunso O. (2024). A Non-invasive Technique for Sleep Quality Appraisal among Adults in Developing Countries: A Case Study of Southwestern Nigeria. *Journal of Science and Information Technology (JOSIT)*, Vol. 18 No. 2, pp. 104-114.

anxiety, diabetes, cardiovascular disease, and accidents due to weariness and all of which sometimes could increase mortality (Pacheco *et al*., 2023).

A crucial precondition for maintaining the body's physiological health and improving sleep is the scientific assessment and tracking of sleep quality (Slavish, 2021). In order to effectively treat sleep disorders and related difficulties, medical professionals and researchers must have an accessible practical method for identifying sleep problems, evaluating the quality of sleep, and suggesting corrective measures. Advances in sleep-monitoring technology provide for objective proof of high-quality care through sleep quality evaluations with non-wearable sleep trackers (Yamakawa *et al*., 2024).

The assessment of sleep quality frequently includes both objective and subjective sleep techniques. The term "subjective sleep assessment" mainly refers to the qualitative and quantitative evaluation of each person's unique sleep pattern parameters as well as the documentation of their subjective feelings. These feelings include things like sleep efficiency, the duration, continuity, daytime functioning, and subjective quality. The foundation of objective sleep evaluation is the careful observation and examination of one or more human bio-signals using specialized sleep monitoring equipment, such as actigraphy spectral frequency, polysomnography (PSG), etc., in order to monitor and evaluate the structure and state of sleep. The subjective sleep approach is less expensive, simpler to use, and appropriate for large-scale research and clinical screening than polysomnography and actigraphy, which are more costly, time-consuming, and not easily accessible for research investigations or clinical diagnosis (Chen *et al*, 2023).

Fabbri et al. (2021) stated that a number of self-reported questionnaires have been created and shown effective in evaluating the quality of sleep. Self-reported questionnaires have been found to be useful in clinical trials, epidemiological studies, and routine care. They have many benefits, such as low cost, can be administered online or in person to a variety of populations, they are self-explanatory, and do not need supervision, they have high patient compliance, and are easily administered. Many individual complaints are that they are unable to get enough sleep at night, even when they have the opportunity, and that they feel drowsy during the day (Fabbri *et al*, 2021). Therefore, self-reported sleep evaluation questionnaires may comprise all of the aforementioned components, or only a portion of them, or they may be specifically designed to assess certain forms of sleep problems (such insomnia or excessive daytime drowsiness). A well-crafted questionnaire needs to be valid, dependable, lucid, concise, and engaging. Any self-developed questionnaire's construct should be able to measure, compute, and provide accurate results that can be trusted, as well as provide results that are binding and acceptable. It should also demonstrate correlation among the data set for high dimensionality rating. A good questionnaire should have a Cronbach alpha reliability value of 1 or ≥ 0.7 or a test-retest reliability score of the same value as alpha which indicates greater internal consistency within the data set or a higher agreement between raters or evaluators (Fabbri *et al*, 2021). In the same vein, the questionnaire should be sensitive to change such that even if some of its parameters are varied, it could still measure what it is intended to measure. Validity and internal consistency are necessary for a study to be successful, even though reliability alone is not enough. As a result, a test must also be valid in order to be dependable. Construct validity of a sleep questionnaire affects its ability to identify both good and bad sleepers (Fabbri *et al*, 2021) Due to the frequency and importance of sleep disorders, it is necessary to work toward gaining widespread support for a system that can reliably identify important aspects of sleep, facilitate suitable self-care, and serve as a triage system for expert assessment (Marie Trotti et al., 2009).

A growing number of people are experiencing poor sleep, which is a public health concern. Convenient and non-

invasive, sleep-monitoring gadgets, such as wearable and non-wearable sleep trackers, are becoming more and more popular. Real-time and continuous sleep monitoring is made possible by non-wearable sleep trackers, which allow for an objective assessment of sleep quality based on sleep characteristics. According to Yamakawa *et al.* (2024), non-wearable sleep trackers could be used to evaluate patients' health and sleep quality based on physiological and sleep characteristics, especially whether they are in pain or in a state of health decline. Nevertheless, several studies used different sleep metrics to measure the quality of sleep. Researchers and caregivers may find it easier to provide care that takes sleep-related aspects into account if they use non-wearable sleep trackers. In both clinical and home-based care settings, non-wearable sleep trackers can enhance sleep quality evaluations. Nonetheless, procedures and standards for evaluating the quality of sleep with non-wearable sleep monitors must be created, and in order to deliver high-quality care, caregivers must be capable of comprehending a variety of sleep factors, analyzing data from visualized non-wearable sleep trackers, and translating this information.

The purpose of this study was to evaluate and provide an overview of "*SSQ3*[26"] (subjective sleep quality, on 3 categories, and 26 items) a self-developed sleep questionnaire on subjective sleep factors (environmental factors, health factors and socioeconomic factors) among adults in Southwestern Nigeria as it impact their sleep quality, and compared the outcome of this evaluation with four randomly selected pre-existing sleep questionnaires, PSQI (Pittsburgh Sleep Quality Index), Berlin questionnaire, Stop Bang questionnaire, and OSA50 (Obstructive Sleep Apnoea) to validate its usefulness/explicitness as an instrument to assess sleep quality

RELATED WORKS

A related study by Chen *et al,* (2023) emphasized the scientific assessment and monitoring of sleep quality as a crucial precondition for protection and one that is required to support the human body's physiological well-being. Chen *et al,* (2023) posited that the assessment of sleep quality is a person's sense of self-satisfaction when all the boxes pertaining to the sleep experience have been checked. While objective evaluation results are more logical and scientific, subjective evaluation is appropriate for clinical screening and large-scale research. However, if more scientific monitoring data are desired, subjective and objective monitoring might be merged to provide a dynamic monitoring system for a thorough assessment of sleep (Chen *et al.,* 2023). Both subjective and objective sleep assessments have benefits, even though the scale selection has a significant impact on the subjective perception of sleep quality. Subjective sleep methods of evaluating sleep quality are inexpensive, simple to use, and clear. In recent years, wearable and contactless sleep monitoring technologies have advanced quickly, and self-powered sleep monitoring technology is one of the future research paths.

Although sleep questionnaires are the least accurate method of assessing sleep when compared to polysomnography, contact devices, contactless devices, and sleep diaries, respectively, a survey study on sleep assessment methods conducted by Ibanez et al. (2018) found that subjective methods such as sleep questionnaires and sleep diaries are the most effective in assessing and characterizing patients' perceptions of their sleep. Therefore, to have a high sleep quality approach, sleep detection techniques could be combined to create a synergy between objective and subjective methods.

Taking a history is the initial step in identifying sleep problems, according to Kong *et al.* (2019). Taking a patient's history reveals details about their complaints, the causes of their sleep issues, their sleep hygiene, their use of drugs like alcohol and caffeine, and their

night-time habits. Sleep questionnaires and sleep diaries are the main instruments used to assess an individual's sleep habits or issues. A sleep diary is a straightforward instrument that takes one to two minutes to complete and is used to track a person's sleep patterns. Time to go to sleep, time to wake up, amount of time it takes to fall asleep, length of sleep, number, times, and duration of awakenings, naps during the day, exercise, medicine, caffeine, or alcohol consumption are all included in sleep diaries. In the meanwhile, a sleep questionnaire offers a broad assessment of the subjective quality of sleep and is frequently employed as the initial diagnostic test in a primary care context. Compared to sleep diaries, sleep questionnaire offer a number of benefits. They require no specialized equipment, have a brief examination period, and do not require expert help (Snyder *et al.*, 2018). In clinical settings, sleep questionnaires are frequently used to aid in patient diagnosis by general practitioners or sleep specialists. Numerous people suffer from a variety of sleep disorders. In order to diagnose sleep disorders or issues early on, it is crucial to perform the proper sleep questionnaire. Sleep questionnaires are helpful for patients in primary care settings because they are affordable and simple to administer, even though they are not as accurate as polysomnography. They can also be used as research tools, to screen a particular demographic, and to monitor the effectiveness of a treatment. Recently, certain sleep assessments have been made more user-friendly by being produced as smartphone apps Kong *et al.* (2019).

METHODOLOGY

Materials

A community-based cross-sectional study was conducted among adults in three major age groups in Nigeria and South-western Nigeria in particular – prime working age (18 – 40 years), mature working age (41 – 60 years), and the elderly (above 60 years of age bracket). The study was approved by the experts in the Institute for Advanced Medical Research and Training, College of Medicine, University of Ibadan.

Sample and sampling method

For the purpose of this study, convenient and purposive sampling techniques were used to select 207 participants in total.

Instrument for data collection

A structured, self-developed questionnaire "*SSQ3*$^{26"}$ was used for data collection. It has Alpha reliability coefficient of 0.735

Methods

Procedure for data collection and Data analysis

Google form was created and used to administer the questionnaire. In addition, questionnaire was also distributed physically to people who could not access through it online.

The "*SSQ3*$^{26"}$ was developed to analyze the study population's subjective sleep variables and see whether it may be used as a tool to measure sleep quality, particularly among this population. The "*SSQ3*$^{26"}$ comprises 26 items in 3 categories, each with a 4-point Likert scale from 1 to 4 and reverse scoring from 4 to 1. A score of less than 46 suggests sleeplessness, a score between 46 and 59 shows reasonable drowsiness, and a score above 60 indicates potential sleepiness. The simplicity and explicitness of the "*SSQ3*$^{26"}$ were shown in Tables 7 and 8.

Sleep monitoring is of major importance especially for the detection of sleep disorder and any impeding behavioural patterns to sleep quality. Sleep monitoring could be tasking due to several technical considerations and privacy, but its success cannot be overemphasized. Quality sleeps translate to a healthy lifestyle and in essence, a better community and good ageing. The aim of this study is to validate "*SSQ3*$^{26"}$ as a non-invasive technique to assess sleep quality among adults from developing nations.

RESULTS AND DISCUSSION

Results

Table 1 showed the descriptive analysis of the data collected from the demographic information of the respondents, where out of the 207 participants, 120 were male, and 87 were female. In the aspect of age bracket, 120 respondents were between the age brackets 18-40 years and 77 respondents were in the 41-60 years age bracket, while only 10 respondents were in the age bracket of 60 years age and above representing 58%, 37.2%, and 4.8% respectively. Out of the total participants (207), 85 respondents work within 8 hours daily, 29 respondents work more than 8 hours daily and 93 respondents work less than 8 hours on a daily basis representing 41.1%, 14%, and 44.9% respectively. Other statistical details are as presented in Table 1.

Analysis of sleep quality of respondents is presented in Table 2. As shown in Table 2, 57.5% of the respondents are having good sleep quality whereas 42.5% of respondents are having poor sleep quality. Table 3 showed correlations analysis among demographic factors considered by the study. Table 4 showed correlations analysis among the subjective sleep factors considered by the study. Table 5 showed Body Mass Index Analysis of Study, Table 6 showed the analysis of the total sleep duration enjoyed by the total population of the study, Table 7 therefore showed the outcomes of the developed "*SSQ3*[26"] on related headings for assessment of validity and comparison, and lastly, Table 8 which shows the outcome of the comparison of the "*SSQ3*[26"] with four other sleep questionnaire (PSQI, Berlin questionnaire, Stop Bang and OSA50).

Table 1. Demographic Statistics of the Respondents.

Items	Frequency	Valid Percentage (%)
Gender		
Male	120	58.0
Female	87	42.0
Age		
18-40	120	58.0
41-60	77	37.2
Above 60	10	4.8
Marital status		
Single	49	23.7
Married	156	75.4
Divorced	2	1.0
Religion		
Christianity	177	85.5
Islam	28	13.5
None	2	1.0
Tribe		
Yoruba	182	87.9
Igbo	19	9.2
Hausa	6	2.9
Work duration		
8 hours daily	85	41.1
More than 8 hours daily	29	14.0
Less than 8 hours daily	93	44.9
Do you sleep easily		
Yes	145	70.0
No	30	14.5
Occasionally	32	15.5
Bodyweight		
50kg – 100kg	182	87.9
Less than 50kg	11	5.3

More than 100kg	14	6.8
Body height		
1.5m-2m	154	74.4
1m-1.5m	48	23.2
Less than 1m	3	1.4
More than 2m	2	1.0

Table 2. Sleep Quality Table.

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
Poor sleep	88	42.5	42.5	42.5
Good sleep	119	57.5	57.5	100.0
Total	207	100	100	

Table 3. Correlations among the Demographic Factors for the Study.

Correlations

		Gender	religion	age	maritalstatus	natureofwork	doyouruns hiftatwork	hobby	bodyweight	bodyheight	subjective sleepfact orsscore
Gender	Pearson Correlation	1	-.037	-.196**	.165*	-.162*	.005	.184**	.066	.195**	-.028
	Sig. (2-tailed)		.600	.005	.017	.019	.941	.008	.346	.005	.686
	N	207	207	207	207	207	207	207	207	207	207
religion	Pearson Correlation	-.037	1	.064	-.005	-.042	.029	-.018	.046	-.029	-.064
	Sig. (2-tailed)	.600		.361	.940	.545	.683	.800	.512	.674	.363
	N	207	207	207	207	207	207	207	207	207	207
age	Pearson Correlation	-.196**	.064	1	-.302**	.039	.119	-.098	.118	-.078	-.109
	Sig. (2-tailed)	.005	.361		.000	.581	.088	.158	.090	.266	.119
	N	207	207	207	207	207	207	207	207	207	207
maritalstatus	Pearson Correlation	.165*	-.005	-.302**	1	.204**	.052	-.083	-.039	.149*	-.009
	Sig. (2-tailed)	.017	.940	.000		.003	.457	.237	.577	.032	.903
	N	207	207	207	207	207	207	207	207	207	207
natureofwork	Pearson Correlation	-.162*	-.042	.039	.204**	1	-.041	-.117	-.019	.132	-.061
	Sig. (2-tailed)	.019	.545	.581	.003		.560	.093	.787	.058	.381
	N	207	207	207	207	207	207	207	207	207	207
doyourunshiftatwork	Pearson Correlation	.005	.029	.119	.052	-.041	1	-.098	.105	.063	.017
	Sig. (2-tailed)	.941	.683	.088	.457	.560		.161	.132	.370	.808
	N	207	207	207	207	207	207	207	207	207	207
hobby	Pearson Correlation	.184**	-.018	-.098	-.083	-.117	-.098	1	-.131	-.088	-.014
	Sig. (2-tailed)	.008	.800	.158	.237	.093	.161		.059	.209	.838
	N	207	207	207	207	207	207	207	207	207	207
bodyweight	Pearson Correlation	.066	.046	.118	-.039	-.019	.105	-.131	1	-.088	-.019
	Sig. (2-tailed)	.346	.512	.090	.577	.787	.132	.059		.206	.790
	N	207	207	207	207	207	207	207	207	207	207
bodyheight	Pearson Correlation	.195**	-.029	-.078	.149*	.132	.063	-.088	-.088	1	-.069
	Sig. (2-tailed)	.005	.674	.266	.032	.058	.370	.209	.206		.325
	N	207	207	207	207	207	207	207	207	207	207
subjectivesleepfact orsscore	Pearson Correlation	-.028	-.064	-.109	-.009	-.061	.017	-.014	-.019	-.069	1
	Sig. (2-tailed)	.686	.363	.119	.903	.381	.808	.838	.790	.325	
	N	207	207	207	207	207	207	207	207	207	207

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 4. Subjective Sleep Correlations.

	Subjective Sleep Factors Score	Environmental Factors	Socioeconomic Factors	Health Factors
Subjective Sleep Factors Score Pearson Correlation Sig. (2-tailed)	1	.852**	.744**	.747**
Environmental Factors Pearson Correlation Sig. (2-tailed)	.852**	1	.420**	.432**
Socioeconomic Factors Pearson Correlation Sig. (2-tailed)	.744**	.420**	1	.434**
Health Factors Pearson Correlation Sig. (2-tailed)	.747**	.432**	.434**	1

** Correlation is significant at the 0.01 level (2-tailed)

Table 5. Body Mass Index Analysis of the Respondents.

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
Healthy BMI	187	90.3	90.3	90.3
Overweight BMI	20	9.7	9.7	100.0
Total	207	100.0	100.0	

Table 6. Duration of Sleep Analysis

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
Less than 6 hours	105	50.5	50.7	50.7
6 hours and above	102	49.0	49.3	100.0
Total	207	100.0	100.0	

Table 7. "*SSQ3*[26]" Outcomes.

S/N	Description of Rating items	VALUES
1	Type of questionnaire-description, age/population	Self-rated questionnaire that evaluates subjective sleep factors impacts on sleep quality
2	Number of items	26 self-reported items, plus 12 demographic questions
3	Number of categories and domains	4 categories
4	Name of categories/domains	Environmental factors, Socio-economic factors, and Health factors
5	Scaling of items	4-point Likert scales from 1 – 4 and also reverse scoring of 4 - 1
6	Scoring available: with permission or free	Available with permission
7	Scoring test-retest reliability	Yes, correlation coefficient 0.852 (Pearson two tailed test)
8	Scoring internal consistency	Yes, Cronbach's alpha = 0.735
9	Validity	Sensitivity 80.6% and Specificity 78.7%
10	Language	English
11	Translations in other language	Yoruba, Hausa, and French
12	Developer name and contact details	'Gbemi Odumosu and S.O. Ismaila both of the Department of Mechanical Engineering, COLENG, Federal University of Agriculture, Abeokuta, Ogun-State, Nigeria. Email: simplygbemiolawale@gmail.com
13	Limitations	Subjective sleep evaluation

Table 8. Comparison between "*SSQ3*[26]", PSQI, Berlin questionnaire, Stop Bang and OSA50.

S/N	RATING ITEMS	"*SSQ3*[26]"	PSQI	Berlin	OSA 50	Stop Bang
1	Type of questionnaire-description, age/population	Self-rated questionnaire that evaluates subjective sleep factors impacts on sleep quality	Self-rated questionnaire that assesses adult patients sleep quality and disturbances over one month	Self-administered questionnaire	Screening for obstructive sleep apnea	The STOP questionnaire and subsequently expanded STOP-Bang questionnaire were developed to assess risk of underlying OSA in surgical patients. Developed as a concise and easy to use screening tool to identify patients with a high risk of underlying moderate to severe OSA.
2	Number of items	26 self-reported items, plus 12 demographic questions	19 self-reported items + 5 additional questions for bed partner	10	4 questions	8 (snoring, tiredness, observed apnea, hypertension, BMI > 35 kg/m^2, age > 50 years, neck circumference ≥ 16 inches, and male gender)
3	Number of categories and domains	4 categories	7 domains	3 categories	Not applicable	Not applicable
4	Name of categories/domains	Demographic factors, Environmental factors, Socio-economic factors, and Health factors	Subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction	Snoring and witnessed apnea (5 questions) Excessive daytime sleepiness (4 questions) History of high blood pressure or obesity (1 question plus height and weight)	Not applicable	Not applicable
5	Scaling of items	4-point Likert scales from 1 – 4 and also reverse scoring of 4 - 1	4-point Likert scales ranging from 0-3; some open-ended questions that can be converted to scaled scores	Each category's responses are scored as positive/negative; two or more positive categories indicate high likelihood of sleep disordered breathing	0-3 and 0-2	Yes/No – each yes scored as 1 point
6	Scoring available: with permission or free	Available with permission	Available with permission	With permission from Dr. Netzer.	Use with permission	With permission from developer
7	Scoring test-retest	Yes, 0.790	Yes, correlation coefficient =	Variable: 0.74 – 0.98	Correlations not	Yes, Kappa coefficient 0.923 (CI

	reliability		0.85 (paired t tests and Pearson product-moment correlations)	(Cohen's Kappa) (2-4)	reported	0.82-1.0)
8	Scoring internal consistency	Yes, Cronbach's alpha = 0.735	Yes, Cronbach's alpha = 0.83	Variable: 0.68-0.98 (Cronbach's alpha) (2-5)	Not reported	Yes
9	Validity	Sensitivity 80.6% and Specificity 78.7%	Sensitivity 89.6% and specificity 86.5% (original publication)	Yes	Yes, compared with a general health questionnaire, Epworth Sleepiness Scale, Berlin questionnaire, STOP-BANG, P-SAP, DES-OSA	Internal validity of questionnaire confirmed using polysomnography (PSG) as reference test. External validity measures adequately met.
10	Language	English	English	English	English	English
11	Translations in other language	3 languages	37 languages	14 languages	Not applicable	22 languages
12	Developer name	'Gbemi Odumosu, & S.O Ismaila	Daniel J., Buysse, M.D	Nikolaus C. Netzer, PhD	Chai-Coetzer C, MD et al, Adelaide Institute for Sleep Health, Repatriation General Hospital, Daws Road, Daw Park South Australia 5041, Australia	Frances Chung.
13	Limitations	Subjective sleep evaluation	Score of >5 to differentiate between "poor" sleepers (depressed patients) and "good" sleepers (healthy subjects). May be different in other populations (e.g. patients with sleep disorders, college students etc). Questionable validity when compared to objective measures including PSG(Polysomnography), actigraphy etc.	More sensitive then specific	Pregnant women, patients with significant cognitive impairment, a poorly controlled psychiatric disorder or who had previously received treatment for OSA were excluded and cannot be used in these populations.	Heterogeneity of various populations with varying prevalence should be considered when interpreting results.

DISCUSSION OF FINDINGS

The "*SSQ3*[26"] results showed, among other things, a significant inverse association between age and sleep quality, meaning that as people age, their quality of sleep diminishes; also, the nature of their employment and sleep quality, meaning that their type of job significantly influences their quality of sleep.

Additionally, "*SSQ3*[26"] demonstrated a strong positive correlation between marital status and sleep quality, as well as between hobbies and sleep quality and body height. In other words, marriage promotes good sleep; hobbies (sports, singing, travel, gisting, reading, researching, watching movies, etc.) enhance good sleep quality, and the more the height of an individual, the better their sleep quality.

The questionnaire, "*SSQ3*[26"], was equally able to reveal significant positive relationships among the three main domains of the questionnaire which are health factors, environmental factors, and the socioeconomic factors i.e. The more suitable the atmosphere (in terms of noise reduction, neatness of the environment, well-ventilated, secured environment etc.), the better the health state, the better the sleep. In addition, higher socioeconomic characteristics (kind of work, income and cash on hand, reduced anxiety, etc.) also contribute to higher sleep quality. The questionnaire was able to generate important anthropometrics data and demographic details of an average Nigerian adult that are useful in various human design consideration measures. The "*SSQ3*[26"] questionnaire was found to be a useful and reliable tool for assessing sleep quality. It was compared to other sleep questionnaires based on several parameters, including sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), number of items and their effect on likelihood ratios for positive and negative test results (LR+ and LR−), flexibility, and translation into other languages as seen in Table 8 and it could be concluded that the "*SSQ3*[26"] is a potent tool to appraise sleep quality of an individual especially among the Nigerian populace.

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