

# **SLEEP: AN INSIGHT TO THE NEGLECTED COMPONENT OF HEALTHY LIFESTYLE**

**Adelowo, Abiodun Bamidele**

*Dept. of Human Kinetics and Health Education,  
Faculty of Education, University of Lagos  
adelowoab@gmail.com*

## **Abstract**

*Human beings, exhibit daily patterns of rest and activities and until a few years ago, little is known about the sleep process, its benefits, and the possible consequences of inadequate sleep. Scientific advances and input from diverse clinical disciplines have enriched the study and management of sleep disorders. Multiple evidences are now available to show that the sleep process is essential to the improvement and maintenance of mental health (like mood stabilization, good memory, cognitive performance), physical health (like healthy cardiovascular and metabolic systems), and productivity in the society. Poor quality and quantity of sleep has been associated with increased risk for accidents, hypertension, cardiovascular diseases, diabetes mellitus, mental disorders, some cancers, and ultimately increase mortality. Health promotion programmes with focus on healthy living and lifestyle modification is essential in the attainment of individual sleep need and repayment of sleep debt. This article provides a brief insight into the often misunderstood purpose and architecture of sleep, the benefits of adequate and restorative sleep, and the health consequences of inadequate sleep, especially as it relates to sleep need and sleep debt. It concludes by suggesting practical sleep hygiene and lifestyle intervention measures that can be adopted to harness the full health benefits of this often-neglected component of promotive healthcare.*

**Key Words:** *Sleep need, Sleep debt, Sleep hygiene, Health promotion, Healthy living.*

## **Introduction**

Every night, the human body undergoes a form of hibernation with resulting physical and physiological changes. Upon awakening, little or nothing is remembered about this ‘mystery’ of the night and except in few instances, most people never contemplate or appreciate this dynamic process. As observed by Colten and Altevogt (2006), the ‘mystery of sleep’ has been a subject of intense interest to poets, religion and mystics since time immemorial, and it is found in many ancient folklores, religious books, and literatures. For some with Christian religious inclination, without sleep, the first female, and by extension the birth of all humans would not have been possible. Despite the technological advancement and scientific breakthrough of the 21<sup>st</sup> century, the dynamics of sleep is still a subject of debate in many fora and will likely going to remain a subject of immense interest in the nearest future.

Although humans spent about one-third of their life sleeping, for centuries, little is known of the purpose and benefits of sleep, neither is much

known about the possible consequences of not having enough sleep. Some motivational speakers have even ascribed getting few hours of sleep as a sign of strength, courage, and productivity, while prolonged sleep is believed to be the venture of the lazy and less productive of the society. The Wellness Council of America (WELCOA, 2011) observed that little hours of sleep are almost worn as a badge of honour in many cluster groups, especially among the corporate workforce of the modern era. Executives and professionals often pride themselves on working into the late hours of the night, while encouraging their colleagues and subordinates to trend similar path. Some people, especially students, choose to intentionally and voluntarily engage in very little time sleeping, in order to have more time for other presumably 'more important' issues, like studying or socializing. In this time-pressured contemporary 21<sup>st</sup> century, sleeping is sometimes viewed by some people as an inconvenience, wasted time, or lost opportunity. The early morning or late night may be the only time available for focused and uninterrupted work. Additionally, many modern nights economy require shift work and changes in workers sleep schedules (Gurley, 2014). All these scenarios have compromised the adequacy of sleep in this modern era. Indeed, sleep has become the orphan and sacrificial lamb of the 21<sup>st</sup> century.

Emerging science and advances in technology are now changing the narrative and the thought process around sleep. Scientists are now understanding and appreciating better the vital neurological and physiological processes that take place during sleep. Within the past four decades remarkable advances in the neurophysiology of normal sleep, circadian biology, and in the discovery of the genes that regulate these biological rhythms have provided a scientific framework for the elucidation of the etiology, pathogenesis, and potential consequences and treatment of sleep disorders (Colten and Altevogt, 2006). It now emphatically clear that everybody on earth needs quality and adequate sleep to live a healthy and long life, devoid of recurrent and chronic diseases.

### **Defining the Sleep Process**

Perhaps more elusive than the purpose and importance of sleep, is the definition of sleep itself. Although all organisms exhibit daily patterns of rest and activity that resemble the daily sleep and wakefulness patterns seen in humans, most people will struggle to define the process accurately (Shea & Quan, 2012). Based on the submission of Vyazovskiy and Delogu (2014), sleep is a phenomenon of astounding complexity, which makes it difficult to understand and even more difficult to define unequivocally. However, objectively, sleep can be viewed as the reversible, behavioural state of perception of disengagement from and temporal unresponsiveness to the environment (Hughes, 2008). There are some characteristics that accompany and, in many ways, define sleep, and differentiate sleep from other states of reduced consciousness (such as hibernation and coma).

These include – a period of reduced activity that is associated with a typical posture (such as lying down in a supine position with eyes closed in humans), resulting in decreased responsiveness to external stimuli, and relatively easy to reverse (Shea & Quan, 2012).

### **Scientific Explanation for Sleep**

Apart from the different theories that have been postulated on the reasons for the need to sleep, modern science has proffered a more objective explanation. Generally, people tend to fall asleep partly because of the interplay of two major biochemical substances in the human body (National Institute of Health – NIH, 2005). The first is called Adenosine. This chemical substance builds up in the body during the day, until it reaches a significant high level that triggers sleep. During sleep, the body breaks down the high Adenosine level to its initial low level enough to wake the individual.

The second substance that has been implicated in the sleep process is the hormone called Melatonin. This hormone is a vital component of the internal ‘biological clock,’ also called the circadian rhythm or body clock, which controls the sleep patterns. The biological clock is a small bundle of cells seated in the brain’s pineal gland, and works in a 24 hours cycle (Hughes, 2008; Thomas, 2013). Internal and external environmental cues, such as light signals received through the eyes, and temperature changes, control these cells. In response to decreasing daylight, the biological clock triggers the body to produce Melatonin, which increases drowsy feelings and helps prepare the brain and body for sleep. Because of the biological clock and rise in serum level of Melatonin, people naturally feel the most tired and sleepy between midnight and 7 a.m., after which the Melatonin level in the body would have reduced. People may also feel mildly sleepy in the afternoon between 1 p.m. and 4 p.m. when there is usually a surge in the Melatonin level in the blood. The other hormones that have been noticed to a play role in the sleep process are the Growth hormone releasing-hormone (GHRH), Growth Hormone, and Prolactin, which all promotes sleepiness as their levels increases in the body (Thomas, 2013).

### **Understanding the Dynamic Architecture of Sleep**

Prior to the era of modern sleep research in the early 1920s, scientists regarded sleep as an inactive brain state and a block of time when the brain and body shut down. It was generally accepted then that as the night falls, the sensory inputs from the environment diminished, so too did the brain functions (NIH, 2005; Shea & Quan, 2012). At that time, scientists believed that during sleep, the brain simply shut down, only to restart and regain functionality in the morning. However, in 1929, the invention of the Electroencephalogram (EEG) challenged this way of reasoning. From EEG recordings, it can now be seen that sleep is a dynamic behaviour, one in which the brain is highly active at times, and never

inactive. It is now known that sleep has distinct stages that cycle throughout the night in predictable patterns. Also, how well an individual physically and mentally function in the day will depend not only on the sleep duration, but also on the sleep depth, and the number of sleep stages and cycles that are completed every night.

Using the characteristic EEG patterns, as well as the presence or absence of eye movements, two main types of sleep, have been identified. These are the non-rapid-eye-movement (NREM) sleep (also called the Slow-Wave Sleep), and the rapid-eye-movement (REM) sleep.

**Non-Rapid Eye Movement (NREM) Sleep:** Typically, in healthy adults, sleep begins with non-REM (NREM) sleep. The NREM sleep can be further divided into three distinct stages – N1, N2, and N3. These stages follow each other sequentially. Some literatures have identified a fourth stage (N4), which is similar and almost indistinct from the N3 stage (Vyazovskiy and Delogu, 2014).

**Stage 1 (N1):** In this stage, the sleep depth is shallow, and people can be awakened easily by noises or other disturbances. During this stage, the eyes move slowly, the muscles relax with occasional twitches, and the heart and breathing rates begin to slow down. N1 will lead to N2.

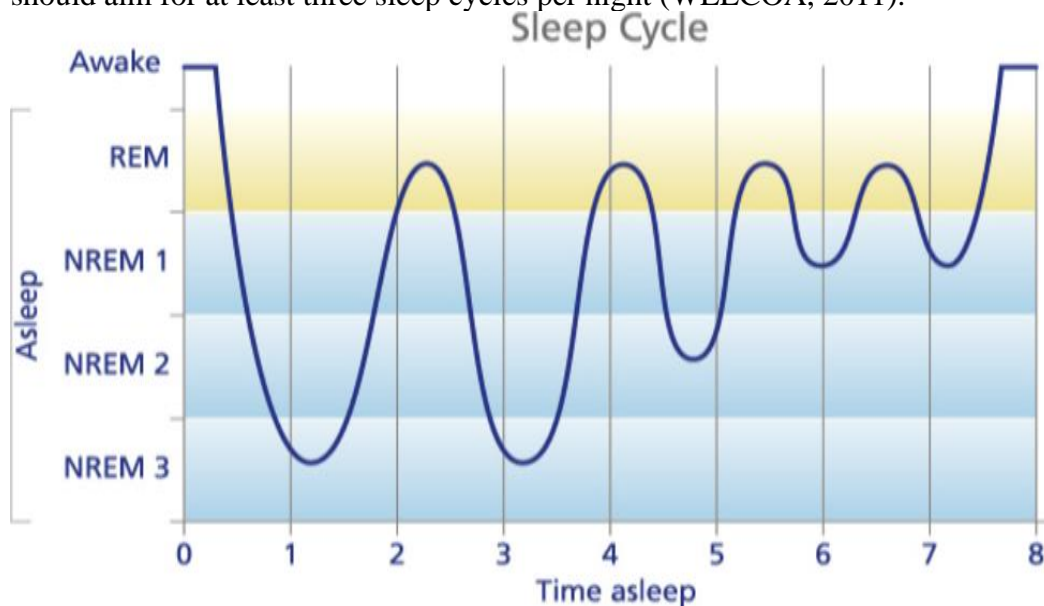
**Stage 2 (N2):** The N2 is characterized by the stillness of the eyes, slower brain waves with occasional bursts of high-frequency rapid brain waves between 12-16 Hz, as well as brief high voltage waves called the K complexes. People generally spend about half of the night in this stage.

**Stages 3 (N3):** On progressing to the stage 3 (the deepest stage of NREM), the brain waves become extremely slow (high-amplitude and low-frequency) almost exclusively, which is called the Delta waves. The heart and respiratory rates are noticed to be slow as well, while the muscles are generally relaxed. This stage is also referred to as the 'deep', 'slow-wave', or 'delta' sleep. It is often very difficult to wake people from the stage 3, while bed wets or sleep walking are usually experienced at this stage (NIH, 2005). The stage 3 of NREM sleep is considered the 'restorative' stage of sleep that is necessary for feeling well-rested and energetic during the day. Some researchers have also identified a fourth stage (stage 4), but it is difficult to differentiate it from stage 3, as their characteristics are similar. Most sleep specialists believe the two stages are the same and often categorised as one.

**Rapid Eye Movement (REM) Sleep:** People generally tend to enter the REM sleep from the stage 3 NREM sleep and this type of sleep usually first occur about 90 minutes after people fall asleep. A repeat and longer, deeper period of REM occur during the second half of the night; cycling along with the non-REM stages throughout the night (Shea & Quan, 2012; Thomas, 2013). The REM sleep, which is often called the 'active sleep,' is identifiable by its characteristic

low-amplitude, mixed frequency rhythm on EEG, as well as the eye movements for which it is named. The eye movement may be due to dreaming since most people that are awakened from the REM sleep report that they had been dreaming. Interestingly, during the REM sleep, skeletal muscles of the arm and leg are temporarily paralyzed. This is thought to be a neurosensory blockade that prevents people from ‘acting out’ their dreams. Also, during REM sleep, the respiratory rate becomes more rapid, irregular, and shallow. While the heart rate, and the blood pressure becomes irregular and often increases. Consequently, people with poorly controlled hypertension may develop stroke at this stage of sleep.

The NREM sleep and REM sleep continue to alternate through the night in a cyclical fashion, although the reason for such a specific cycling pattern across the night is still fully unknown. Some scientists have speculated that the specific sequences of NREM and REM sleep tend to optimize both physical and mental recuperation, as well as some aspects of memory consolidation that occur during sleep, although this position has not been extensively investigated (Shea & Quan, 2012). Each sleep cycle lasts around one and a half (1½) hours and people need to experience all the four distinct stages in a cycle in order to wake up rested and refreshed. Also, a restorative sleep consists of five or six cycles, whereas poor or inadequate sleep consists of far fewer cycles (Thomas, 2013). In order to obtain the maximum benefits from sleep, it has been advocated that people should aim for at least three sleep cycles per night (WELCOA, 2011).



**Figure 1.** A graphical illustration of the stages of sleep  
Source: Thomas (2013)

### **Declining Sleep: An increasing Global Reality and a Threat to Public Health**

Historically, adequate sleeping time was never the problem of most people globally. For instance, in 1910, most people in the world slept an average of 9 hours a night, whereas, in this modern era, the average adult now sleeps fewer than 7 hours a night (NIH, 2005). Current statistics also show that the duration and quality of sleep are declining globally with devastating effects on the health and wellbeing of the people, and economy of most countries. As observed by Shea and Quan (2012), on an average night, 30 to 40 million Americans have difficulty falling asleep, staying asleep, or wake earlier than they would like and cannot get back to sleep. While the NIH (2005) informed that about 70 million Americans are suffering from either chronic sleep loss or sleep disorders. This has been estimated to cost around \$16 billion in direct health care costs and \$50 billion indirectly in loss of productivity annually (NIH, 2005). A national survey in India revealed that about 15% of Indian population suffers from either inadequate sleep or insomnia (Rao, 2016). The female gender, especially the female executives, tends to report more cases of poor sleep, and they also tend to take more sleeping pills (Menon, 2016).

Available reports and studies on sleep in Africa suggest that the magnitude of the problem is far beyond the imagination of most people. For instance, series of studies have shown that inadequate sleep and sleep disorders have a significant role to play in the high prevalence of road traffic accidents (RTAs) in Nigeria. According to the Federal Road Safety Commission of Nigeria (FRSC, 2008), over 80% of RTAs that occur on Nigeria roads on a yearly basis are usually caused by “human factors”, one of which includes ‘sleepiness behind the wheel’. A study by Obaseki *et al.* (2014) revealed that 22% of interstate commercial vehicle drivers in Nigeria usually experience excessive daytime sleepiness, while 36% were at high risk of obstructive sleep apnea. Another study by Bekibelet *et al.* (2007), noticed that the prevalence of self-reported RTAs was significantly high among Nigerian drivers who have sleep deprivation or disorders. Another study concluded that driving under the influence of alcohol was the most significant determinant of RTAs among the participants, followed by excessive speeding, indiscriminate parking, unfocused-driving, and sleepiness (Ojo, 2015). While another study revealed that, the duration of driving, stress, sleep deficit, and alcohol intake contributed significantly to the causes of driver’s fatigue in Nigeria both at 5% and 10% significant levels (Aworemi, Abdul-Azeez, Oyedokun, & Adewoye, 2010).

Sleep deprivation and sleep disorders are also public health concerns among healthcare practitioners in Nigeria. According to a study, more than half of the Nigerian healthcare workers (54.2%) were experiencing poor sleep, and it is commonest among the nurses (42.7%). While among affected nurses, poor sleep was significantly commoner among shift worker (77.1%) (Kolo, Ahmed, Hamisu, Ajiya, & Akhiwu, 2017). Poor sleep and sleep disorder might affect the

concentration, judgment, and performance of health workers, whose essential duties are vital to human survival and wellbeing.

Studies have also revealed a strong relationship between mental health and sleep disorders among the Nigerian population. A study revealed that out of the participants with clinically diagnosed depression, 96.6% had some forms of sleep disturbance, 21.9% stayed more than 60 minutes before falling asleep, 85.9% were poor sleepers, 90.4% had habitual sleep deficiency greater than 85%, while 33.7% had difficulty staying awake while driving, eating meals, or engaging in social activities (Shittu *et al.*, 2014). Another study that was conducted among psychiatric out-patients in Lagos, Nigeria, reveals that the prevalence of insomnia in the study the population was 20.1% and it was significantly more among the patients diagnosed with major depression (33.3%), followed by patients with bipolar affective disorder (24.0%), anxiety and other neurotic disorders (18.0%), and schizophrenia (10.6%). The researchers also noticed that the insomnia prevalence negatively correlates to the estimated sleep duration of the patients (Ogbolu, Aina, Famuyiwa, & Erinfolami, 2012). These studies suggest that the prevalence of sleep deficit and sleep-related consequences (especially RTAs and mental disorders) are increasing in Low- and Middle-Income Countries (LMICs), like Nigeria. The global declining sleep duration and quality have also been associated with the global rising prevalence of chronic noncommunicable diseases. A situation that demands urgent and comprehensive intervention from all stakeholders.

### **The Concept of Sleep Debt and Sleep Need**

Although the rapid eye movement (REM) sleep is the last stage of sleep, it is the most critical stage. If the REM sleep is severely disrupted or interrupted during one night, the body typically enters a sleep deficit mode, popularly called 'a sleep debt', which it attempts to 'repay' in the subsequent night. It is observed that in such a scenario, the REM sleep duration is typically longer than normal in subsequent nights until the affected individuals recovered or 'repay' the 'sleep debt' (NIH, 2005; WELCOA, 2011). Failure to 'repay' the 'sleep debt' has been linked to serious short- and long-term health consequences, such as reduced concentration, increase cases of mental and mood disorders, accidents, cardiovascular diseases, diabetes mellitus, some cancers, and early death. It is however possible to fully recover or 'pay off,' or at least reduce considerably the accumulated 'sleep debt' with disciplined sleep hygiene and lifestyle modification (National Sleep Foundation – NSF, 2011). Though, it may be ineffective or even counterproductive to sleep for a long period on weekends to 'repay' a long standing and accumulated sleep debt (NIH, 2005).

Like most questions in sleep, the question of how much time people need to sleep in order to accrue its full benefits and avoid sleep deficit/debt remains controversial. Some people have argued that 4 - 5 hours of sleep is enough and

anything beyond this results in unpleasant experiences for them throughout that day. On the other hand, some have argued that the time duration that ensures good and restorative sleep, especially in adults, is sacrosanct to 7 - 8 hours, and anything below or beyond it is detrimental to the general health and wellbeing. However, according to the NSF (2011), there is no "magic number" for adequate or restorative sleep. Not only do different age groups need different duration of sleep, sleep needs are also individualized. Just like any other genetic or biological characteristics (like blood pressure, heart rate, etc.) that are peculiar to individuals, the duration of sleep that each individual will need to function best may differ from person to person, even with the same age and gender. While some people may be at their absolute best sleeping 7 hours a night, others may clearly need 9 hours to have a healthy body, focused mind, and a productive life. Some persons are even genetically short sleepers who require fewer than 6 hours of sleep, while some are long sleepers who will need more than 9 hours of sleep each night, in order to ensure optimal physical and mental functioning (Menon, 2016).

The NSF (2011) further explained that the main reason why there is "no magic number" for sleep duration in people results from the constant interplay of two biological factors that are genetically specific to each individual: the basal sleep need (the amount of sleep the body genetically/biologically need on a regular basis for optimal performance) and the sleep deficit/debt (the accumulated sleep that is lost to poor sleep habits, sickness, and awakenings at night). Table 1 identifies the "rule-of-thumb" sleep duration that most sleep experts have agreed upon as necessary to ensure optimal mental and physical functioning for the different age groups (NSF, 2011).

Age	Sleep Needs (Hours)
Newborns (0 – 2 Months)	12 – 18
Infants (3 – 11 Months)	14 – 15
Toddlers (1 – 3 Years)	12 – 14
Preschoolers (3 – 5 Years)	11 – 13
School-Age Children (5 – 10 Years)	10 – 11
Teenagers (10 – 17 Years)	8.5 – 9.25
Adults	7 – 9

**Table 1.** The Sleep Needs according to Age.

**Source:** National Sleep Foundation (NSF, 2011)

The NIH (2005) however warned that the quality of sleep and the timing of sleep are as important as the quantity/duration. Even if adequate in duration, people whose sleep is frequently interrupted or cut short may not get the full health benefits of good and restorative sleep. Apart from this general guideline, there are times when more sleeping time is required in order for our bodies to function properly, for instance during ill health and in pregnancy (Raley, 2017).

Interestingly, long sleep durations (more than 9 hours) may also be associated with increased morbidity (headache, back pain, diabetes mellitus, heart diseases, depression, accidents) and mortality, especially for an apparently healthy person (NSF, 2011). Consequently, the relationship between sleep duration and health can be seen as a "U-shaped" curve where both too little and too much sleep may put people at health risk. A comprehensive and personalized sleep assessment remains the best method of determining the ideal sleep need or duration for each individual (NSF, 2011).

### **The Health Benefits of Adequate Sleep**

Even without fully understanding all the values of sleep to humanity, all stakeholders seem to agree that poor night sleep most times makes most people to feel unrefreshed and sometimes unwell, while a good night sleep makes most people feel refreshed and ready for the day's challenges. As emphasized by Kennedy and Adhikari (2016), sleep has no substitute and an average of 8 hours of sleep is very important and essential to good health. Sleep plays a critical role in proper immune functioning, metabolism, memory, learning, and other vital functions. Gurley (2014); Seaward (2008) also alluded that people who fight the urge to sleep for several days begin to show signs of psychosis after a while, a situation which tends to reverse with adequate sleep. Some of the general physiological processes that critically depend on adequate sleep for their efficacy and optimal functioning include effective ontogenesis, repair or replacement of damaged or dead cells, memory processing, DNA remodeling and repairs, leptin secretion, fatty acid metabolism, optimal cell division, anabolic/catabolic cycle for metabolic processes such as building cell tissue and breaking down tissue, and preservation of the cells and tissues (Seaward, 2008).

Some of the other benefits of adequate restorative sleep as identified by Gurley (2014); Harita (2016); Menon (2016); NIH (2005); Shea & Quan (2012) include: it is the most important single index and determinant of good mental health. It is associated with better ability to learn a new task, better resolution of creative problems, better focus and attention, improved memory, reduced the tendency to get confused, improves reaction time, and reduced the risk of migraine headache and depression. Adequate sleep also improves cardiometabolic functioning and blood pressure control, while ensuring better hormonal functions and stronger immunity. By promoting early and efficient gastric emptying, it helps to effectively prevent and manage some gastrointestinal disease conditions like constipation, diverticulitis, hemorrhoid, and gastrointestinal cancers.

### **The Health Consequences of Inadequate Sleep**

Inadequate sleep and prolonged sleep debt tend to play significant roles in the development of certain chronic diseases, such as obesity, diabetes mellitus,

cardiovascular diseases, and hypertension. Inadequate sleep also increases the risk for mood and mental disorders, such as depression, anxiety, mental distress, bipolar disorder, seasonal affective disorder, post-traumatic

stress disorders (especially in soldiers), and suicide. Impaired learning and performance with an increased tendency to commit a crime is also significantly high in adult population that gets less than 6 hours of sleep on a regular basis. This is so because prolonged inadequate sleep has been associated with emotional distress, impaired moral judgment, alteration of mood, misinterpretation of social cues, decreased alertness and cognitive processing speed, and diminished fear extinguishing ability. Poor sleep also tends to alter the immune functions (with consequential higher predisposition to infections, especially those of viral origin, like Flu); increased risk of developing certain cancers (like cancers of the breast, endometrium, prostate, colorectal, and acute myeloid leukemia); increase in domestic, industrial, and road traffic accidents; increase in mortality from all causes, and general reduction in life expectancy (Gurley, 2014; NIH, 2005; Rao, 2016).

Table 2 highlighted some of the sleep hygiene and lifestyle modification strategies that should be adopted on a consistent basis to harness the full promotive health benefits of sleep, and reduce the associated health consequences, either by the sick, the at-risk, or the general population.

Categories	Recommendations
<b>Right Attitude</b>	<ul style="list-style-type: none"> <li>- Make sleep a priority and schedule sleep like any other daily activity.</li> <li>- Put sleep on your "to-do list" and cross it off every night before sleep.</li> </ul>
<b>Sleep Routine</b>	<ul style="list-style-type: none"> <li>- Ease the transition from wake time to sleep time with a period of relaxing activities about an hour before bed. Such activities can include taking a warm bath, reading a book, watching a non-stimulating movie, practice of relaxation exercises (like yoga and meditations), and listening to soothing music.</li> <li>- Avoid stressful and stimulating activities close to bedtime.</li> <li>- Establish the same sleep and wake schedules, even on weekends.</li> <li>- Do not nap. If you must, it should be kept short (&lt; 1 hour) and before 5 p.m.</li> </ul>
<b>Sleep Environment</b>	<ul style="list-style-type: none"> <li>- Lower the volume of outside noise and from 'white noise' appliances with earplugs or ear muffs.</li> <li>- Switch off light. Use heavy curtains, blackout shades, or eye mask to block light.</li> <li>- Keep the room temperature cool (between 16 and 24 °C), and well ventilated.</li> <li>- The mattress and pillows should be comfortable for your need.</li> </ul>

	<ul style="list-style-type: none"> <li>- Limit the bedroom activities to sleep and sex only.</li> <li>- Keep pets, computers, TV, cell phones, and work materials out of the room.</li> </ul>
<b>Food and Drinks</b>	<ul style="list-style-type: none"> <li>- Eat light evening meals, at least 2 to 3 hours before bedtime.</li> <li>- Avoid spicy, chocolates, or any food that may cause indigestion close to bedtime.</li> <li>- Avoid caffeinated drinks (found in some coffee, tea, and soda) after 7 p.m.</li> <li>- Balance fluid intake at night. Too little might lead to thirst, while too much might lead to frequent urge to urinate, both of which might wake you up at night.</li> <li>- Limit alcohol intake to <math>\leq 1 - 2</math> standard bottles per day, and avoid alcoholic drinks at least 3 hours before bedtime.</li> </ul>
<b>Exercise and Sunlight</b>	<ul style="list-style-type: none"> <li>- Get moderate-intense exercise for at least 30 minutes most days in a week, but not more than 3 hours before bedtime.</li> <li>- Let in sunlight first thing in the morning, and get 30 minutes – 1hour midday sunlight exposure most days in a week.</li> </ul>

**Table 2.** Recommended Sleep Hygiene and Lifestyle Modification to Improve Sleep Quality

### Conclusion

The demystification of sleep and the understanding of its critical roles in the promotion of physical and mental health and wellbeing remains one of the best scientific discoveries of the 21<sup>st</sup> century. Sleep is now understood as probably the cheapest component of preventive and promotive healthcare, arguably the most priceless, but unfortunately one of the most neglected. In recent years, researchers have learned a lot and are still learning about the dynamics and benefits of sleep, and the health implications of sleep deprivation. Good sleep is now positively associated with good physical and mental health, disease prevention, faster recovery from illnesses, and longevity. It has also been associated with better productivity, lesser accidents, and reduced crime in the larger society. The voluntary self-denial of adequate sleep is not only unhealthy and unwise, but it is also counterproductive, and the body will likely ‘repay’ the sleep deficit or debt at one point in the lifetime, failure of which often lead to serious health consequences and even in some cases shorter life expectancy.

Health promotional programmes on the science and benefits of adequate sleep should be made widely available to the sick, at-risk, and the general population within and outside the school settings. Research opportunities into the numerous knowledge gaps in sleep science should be encouraged, while the practice of routine sleep assessment and management should be incorporated into the primary healthcare system of every country, especially in the management of chronic non-communicable diseases. Health teachers should consciously teach

importance of adequate quality sleep to learners at levels of education in the country.

### ORCID

<https://orcid.org/0000-0003-0064-2209>

### References

- Aworemi J. R., Abdul-Azeez I. A., Oyedokun A. J., & Adewoye J. O. (2010). Efficacy of drivers' fatigue on road accident in selected Southwestern States of Nigeria. *International Business Research*, 3(3), 225 – 232.
- Bekibele C. O., Fawole O. I., Bamgboye A. E., Adekunle L. V., Ajav R. & Baiyeroju A. M. (2007). Risk factors for road traffic accidents among drivers of public institutions in Ibadan, Nigeria. *African Journal of Health Science*, 14, 137-142.
- Colten H. R. & Altevogt B. M. (2006). *Sleep disorders and sleep deprivation: An unmet public health problem*. National Academy of Sciences. Date of access: 7/5/2016. <http://www.nap.edu/catalog/11617.html>.
- Federal Road Safety Commission (2008). *Nigeria highway code (2nd ed.)*, 2008, Federal Road Safety Commission Library, Abuja.
- Gurley V. F. (2014). *Understanding sleep role in health promotion and chronic disease*. American College of Preventive Medicine. Date of access: 4/8/2017. <http://www.acpm.org/page/LMCurrPilotArchived4>.
- Harita & Vasudha (2016). *Nutrition and weight management lecture series*. St. Francis College-Centre for Professional Studies, Hyderabad India. Date of access: 19/9/2017. <http://websites.creativemediaeg.com/arabianwellness-academics-new/>.
- Kennedy A. & Adhikari L. K. (2016). *Exercise & fitness lecture series*. St. Francis College-Centre for Professional Studies, Hyderabad, India. Date of access: 22/4/2017. <http://websites.creativemediaeg.com/arabianwellness-academics-new/>.
- Kolo E. S., Ahmed A. O., Hamisu A., Ajiya A., & Akhiwu B. I. (2017). Sleep health of healthcare workers in Kano, Nigeria. *Nigerian Journal of Clinical Practice*, 20, 479-83.
- Menon S. D. (2016). *Health psychology and stress management lecture series*. St. Francis College-Centre for Professional Studies, Hyderabad, India. Date of access: 7/10/2017. <http://websites.creativemediaeg.com/arabianwellness-academics-new/>.
- National Institute of Health (2005). *Your guide to healthy sleep*. Date of access: 3/3/2010. [https://www.nhlbi.nih.gov/files/docs/public/sleep/healthy\\_sleep.pdf](https://www.nhlbi.nih.gov/files/docs/public/sleep/healthy_sleep.pdf).
- National Sleep Foundation (2011). *How much sleep do we really need?* Date of access: 3/3/14. <http://www.sleepfoundation.org/article/how-sleep-works/how-much-sleep-do-we-really->
- Obaseki D. O., Erhabor G. E, Obaseki J. E., Abidoye I., Adebisi A., & Olaiya B. (2014). Obstructive sleep apnea, excessive daytime sleepiness, and road traffic accidents among interstate commercial vehicle drivers in Nigeria. *Journal of Respiratory Medicine*, 1 – 7. <http://dx.doi.org/10.1155/2014/580264>.

- Ogbolu R. E., Aina O. F., Famuyiwa O. O., & Erinfolami A. R. (2012). A study of insomnia among psychiatric out-patients in Lagos Nigeria. *Sleep Disorders Therapy*, 1, 104. doi:10.4172/2167-0277.1000104
- Ojo A. L. (2015). Assessment of human factors as determinants of road traffic accidents among commercial vehicle drivers in Gbonyin Local Government Area of Ekiti State, Nigeria. *Journal of Research & Method in Education*, 5, 69-74. <http://DOI:10.9790/7388-05116974>.
- Rao S.P V. C (2016). *Health management lecture series*. St. Francis College-Centre for Professional Studies, Hyderabad, India. Date of access: 5/11/2017.<http://websites.creativemediaeg.com/Arabianwellness-academics-new/>.
- Raley T. (2017). *How long should you sleep?* Date of access: 5/1/2018.[http://www.ehow.com/facts\\_4813766\\_side-effects-much-sleep.html](http://www.ehow.com/facts_4813766_side-effects-much-sleep.html).
- Seaward B. L. (2008). *A good night's sleep: Stress, insomnia and work productivity*. Date of access: 6/5/2010.[http://campus.murraystate.edu/wellness/read\\_learn/sleep/handout.pdf](http://campus.murraystate.edu/wellness/read_learn/sleep/handout.pdf).
- Shea S. A. & Quan S. F. (2012). *Healthy Sleep: An overview of the processes governing the biology of normal sleep and the consequences of insufficient sleep*. Harvard Medical School, 2012. Date of access: 18/3/2015.<http://www.instituteoflifestylemedicine.org/>.
- Shittu R. O., Sanni M. A, Odeigah L. O., Baba I. B., Olanrewaju G. T., & Isiaka-Lawal S. (2014). Depression and sleep problems in a Nigerian family practice setting. *International Journal of Dream Research*, 7(2), 113 – 120.
- Thomas Y. (2013). *Get a good night's sleep: 7 Practical Steps*. Date of access: 2/4/2016.<http://www.sleepcouncil.org.uk/wp-content/uploads/2013/.../Get-a-Good-Nights-Sleep.pdf>.
- Vyazovskiy V. V. & Delogu A. (2014). NREM and REM sleep: Complementary roles in recovery after wakefulness. *The Neuroscientist*, 20(3), 203–219. <http://DOI:10.1177/1073858413518152>.
- Wellness Council of America (2011). *A good night's sleep: What your employees needs to know about sleep and sleep quality*. Date of access: 11/11/2017.<http://www.marylandportableconcrete.com/LiteratureRetrieve.aspx?ID=160092>.

