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Gadget Use Duration, Sleep Quality, and Anaemia Among Adolescent Girls: A Cross-Sectional Study in Makassar, Indonesia

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ABSTRACT

The increasing duration of gadget use among adolescent girls has raised concerns regarding its potential impact on sleep quality and nutritional health, including anaemia. Prolonged exposure to electronic screens may disrupt normal sleep patterns, which can interfere with physiological processes involved in haemoglobin synthesis. This study aimed to examine the association between gadget use duration, sleep quality, and anaemia among adolescent girls in Makassar, Indonesia. A cross-sectional study was conducted among adolescent girls in Makassar. Data on gadget use duration were collected using a structured questionnaire, while sleep quality was assessed using a validated sleep quality instrument. Haemoglobin levels were measured to determine anaemia status. Data were analysed using descriptive statistics and bivariate analysis to assess associations between variables. The results showed that a considerable proportion of participants reported prolonged gadget use, particularly more than three hours per day. Poor sleep quality was more common among adolescents with longer gadget use duration. Anaemia was identified in a notable proportion of participants. Statistical analysis revealed a significant association between gadget use duration and sleep quality, as well as between sleep quality and anaemia status. Adolescents with prolonged gadget use and poor sleep quality were more likely to experience anaemia. In conclusion, prolonged gadget use is associated with impaired sleep quality, which may increase the risk of anaemia among adolescent girls. These findings highlight the importance of promoting healthy gadget use habits and adequate sleep as part of anaemia prevention strategies in adolescent populations.

INTRODUCTION

Anaemia remains one of the major nutritional problems within the framework of the *Triple Burden of Malnutrition*, particularly among adolescents in developing countries, including Indonesia. According to the World Health Organization (WHO), approximately 30% of women aged 15–49 years worldwide are affected by anaemia, with adolescent girls representing one of the most vulnerable groups. In Indonesia, the prevalence of anaemia among adolescents aged 15–24 years reaches 32%, indicating that nearly one in three

adolescents suffers from this condition (World Health Organization and United Nations Children's Fund (UNICEF), 2024). This figure reflects an increasing trend compared to previous national health surveys, highlighting anaemia as a persistent public health concern (Patimah et al., 2025; Rah et al., 2021).

Adolescence is a critical transitional period characterized by rapid physical growth, psychological changes, and emotional development. During this stage, adolescent girls have an increased risk of anaemia due to higher nutritional requirements, particularly iron, combined with regular blood loss during menstruation. In the long term, anaemia in adolescent girls may increase the risk of adverse maternal and child health outcomes, including the birth of children with stunting, which can negatively affect physical growth and cognitive development (Sharief & M, 2019; Sharief & M., 2021). longside nutritional challenges, adolescents are increasingly exposed to lifestyle changes driven by rapid technological advancement. The widespread use of digital devices such as smartphones, tablets, and laptops has led to prolonged screen time and more sedentary behaviour among adolescents. National data indicate that more than 70% of Indonesian adolescents use gadgets for more than three hours per day, with a substantial proportion exceeding six hours daily (WHO, 2025b), (Kemenkes RI, 2014). Excessive gadget use is often accompanied by unhealthy behaviours, including irregular eating patterns and poor sleep habits, particularly the habit of using gadgets before bedtime (Kemenkes RI, 2018). According to WHO, as many as 30% of women aged 15-49 years in the world suffer from anaemia and 32% of adolescents 15-24 year olds in Indonesia experience anaemia (Kemenkes RI, 2024; WHO, 2025a). Anaemia can cause various non- specific symptoms including fatigue, weakness, dizziness, drowsiness and shortness of breath, especially moment activity. Anaemia in adolescents can cause disturbance concentration, decrease performance study, disturb fitness and productivity and decline immunity (Kemenkes RI, 2022). Sleep plays a crucial role in physical growth, metabolic regulation, and cognitive function during adolescence. The National Sleep Foundation recommends 8–10 hours of sleep per night for adolescents; however, many adolescents fail to meet this recommendation due to late-night gadget use. Insufficient and poor-quality sleep may disrupt hormonal balance, increase stress hormone levels such as cortisol, and interfere with cellular repair and regeneration processes. These physiological disturbances can affect erythropoiesis and overall energy metabolism, potentially contributing to the development of anaemia. Furthermore, prolonged gadget use may indirectly increase anaemia risk by influencing dietary behaviour, such as reduced meal frequency and inadequate intake of iron and other essential micronutrients. (Sharief, et al., 2025), (National Sleep Foundation, 2020).

Teenagers now very depending on the smartphone, tablet or laptop used for learning, as means entertainment, or social media. According to Pangarkar (2025), the use of gadgets worldwide is estimated to as many as 5.47 billion people in 2019, then increase to 7.9 billion in 2022. According to Ministry of Finance (Pangarkar, 2025)data Communication and Informatics The Republic of Indonesia stated that the use of gadgets by children teenager age school are aged 13-19 years amounted to 73.7% or an increase of around 8.9% equivalent to with 25.5 million gadget (Kominfo RI, 2023)users According to data from the Central Statistics Agency, reporting gadget usage data is based on type sex For 51% of men and 49% of women use gadgets . 25% of gadget users aged < 24 years and 35% use gadgets more often. than 6

hours at age < 24 years (Badan Pusat Statistik, 2024). Impact use of gadgets for teenager Can impact positive among them can look for material lesson with applications on the gadget, but can also have a negative impact, especially If using gadgets for too long. Normal use of gadgets is considered still normal if accessible not enough than 3 hours per day. Based on gadget usage data according to *Taylor Nelson Sofrens* (TNS) in Indonesia, gadget use among junior high and high school teenagers has a normal duration of less than from 3 hours per day recorded only as much as 30%, while more use of gadgets from 3 hours per day recorded as much as 70% in 2019. (National Sleep Foundation, 2020)Between negative impact of Using gadgets for too long can influence habit poor eating and sleeping. Lack of Sleep can cause improvement stress hormone production like cortisol, which increases metabolism and needs energy body for maintain normal function. In addition, less Sleep interfere with the repair and regeneration process cell as well as function cognitive, all of which need addition energy (Ouyang et al., 2022).

Although previous studies have examined the relationship between gadget use and sleep quality, as well as the association between sleep quality and anaemia, research that simultaneously investigates the interplay between gadget use duration, sleep quality, and anaemia among adolescent girls remains limited. This gap is particularly evident in local settings, including urban areas such as Makassar, Indonesia. Therefore, this study aims to analyse the association between gadget use duration and sleep quality with the occurrence of anaemia among adolescent girls. The findings are expected to provide evidence-based insights for the development of promotive and preventive strategies targeting lifestyle modification to reduce anaemia risk among adolescent girls, particularly within school and family environments.

METHODS

This analytical cross-sectional study was conducted among adolescent girls aged 12–16 years attending two Islamic junior high schools in Makassar, Indonesia, in 2025. A total of 45 respondents were included using a total sampling technique. Anaemia status was determined by measuring haemoglobin concentration using a portable digital hemoglobinometer (Easy Touch GCHb), with anaemia defined as haemoglobin levels <12.0 g/dL according to WHO criteria. Gadget use duration was assessed using a structured self-administered questionnaire and categorized into four groups (<1 hour, 1–3 hours, 4–6 hours, and >6 hours per day). Sleep quality was evaluated using the Pittsburgh Sleep Quality Index (PSQI), a validated instrument with good internal consistency. Descriptive statistics were used to summarize participant characteristics. Bivariate associations between gadget use duration, sleep quality, and anaemia status were analysed using the Chi-square test, with a significance level set at $p < 0.05$. All instruments used in this study have demonstrated acceptable validity and reliability, ensuring the methodological rigor and internal validity of the findings. This study has received ethical approval recommendations with number 610/A.1/KEP-UMI/VIII/2025 (UMI 012508706).

RESULTS

Characteristics of Respondents

The study involved a total of 45 respondents. Based on age distribution, the majority of respondents were 13 years old, accounting for 60.0% (n = 27) of the total sample. This was followed by respondents aged 14 years, comprising 22.2% (n = 10). Smaller proportions were observed among respondents aged 15 years (8.9%, n = 4), 12 years (6.7%, n = 3), and 16 years (2.2%, n = 1). In terms of class level, most respondents were enrolled in Grade VIII, representing 42.2% (n = 19) of the sample. Respondents from Grade VII accounted for 33.3% (n = 15), while those from Grade IX constituted 24.5% (n = 11). Regarding anaemia status, more than half of the respondents were classified as anemic, with a prevalence of 53.3% (n = 24), whereas 46.7% (n = 21) were identified as non-anaemia.

Table 1. Characteristics Young Women at SMPI Darul Hikmah and SMPI Masjid Raya

Characteristics Respondents		n	%
Age (years)	12	3	6.7
	13	27	60.0
	14	10	22.2
	15	4	8.9
	16	1	2.2
Class	VII	15	33.3
	VIII	19	42.2
	IX	11	24.5
Anaemia Status	Anaemia	24	53.3
	No Anaemia	21	46.7
Total		**45**	**100.0**

Source: Primary Data, 2025

Table 2. Distribution Degree of Anaemia in Adolescent Girls

Characteristics Degrees Anaemia in Adolescents Daughter			n	%
Degree of Anaemia	Hb ≥ 12 g/dL	No Anaemia	21	46.7
	Hb 11-11.9 g/dL	Mild Anaemia	15	33.3
	Hb 8-10.9 g/dL	Moderate Anaemia	9	20.0
Total			**45**	**100**

Source: Primary Data, 2025

Table 2 presents the distribution of anaemia status among adolescent girls based on hemoglobin (Hb) levels. Of the total 45 respondents, nearly half of the participants (46.7%, n = 21) were classified as non-anemic, with hemoglobin concentrations ≥12 g/dL. Meanwhile, mild anaemia (Hb 11–11.9 g/dL) was observed in 33.3% (n = 15) of the adolescents, indicating that one-third of the study population experienced early-stage anaemia. Furthermore, 20.0% (n = 9) of the respondents were identified as having moderate anaemia, with hemoglobin levels ranging from 8 to 10.9 g/dL. Overall, these findings demonstrate that

more than half of the adolescent girls (53.3%) were affected by anaemia to varying degrees, highlighting a substantial burden of anaemia in this population.

Table 3 presents the distribution of gadget use characteristics among the respondents (n = 45). With regard to the length of gadget use, the largest proportion of participants reported using gadgets for 1–3 hours per day (n = 15), followed by those who used gadgets for more than 6 hours (n = 12). Shorter durations of use were reported by 10 respondents who used gadgets for less than 1 hour, while 8 respondents indicated a usage duration of 4–6 hours. In terms of gadget usage time during the day, gadget use was most frequently reported in the evening (n = 17), indicating that this period represents the peak time for gadget engagement. This was followed by use in the afternoon (n = 13) and morning (n = 10). Only a small proportion of respondents reported gadget use at midnight (n = 5).

Regarding the purpose of gadget use, the most commonly reported purpose was entertainment (n = 15), followed by study-related activities (n = 11). The use of gadgets for social media accounted for 10 respondents, while communication purposes were reported by 9 respondents, indicating a relatively balanced distribution across different functional uses. With respect to gadget use before sleep, the majority of respondents reported using gadgets before bedtime (n = 36; 80%), whereas only 9 respondents (20%) indicated that they did not use gadgets prior to sleeping. This finding suggests a high prevalence of pre-sleep gadget exposure among the study population (Table 3).

Table 3. Distribution Gadget Use by Teenage Girls at Darul Hikmah Islamic Middle School

Gadget Use		n	%
Length of gadget use	< 1 hour	10	22.2
	1 – 3 hours	15	33.3
	4 – 6 hours	8	17.8
	>6 hours	12	26.7
Gadget usage time	Morning	10	22.2
	Afternoon	13	28.9
	Evening	17	37.8
	Midnight	5	11.1
Purpose of using gadgets	Study	11	24.4
	Social media	10	22.2
	Entertainment	15	33.3
	Communication	9	20.0
Use of gadgets before Sleep	Yes	36	80.0
	No	9	20.0
Total		**45**	**100.0**

Source: Primary Data, 2025

As per the data presented in Table 4, Most respondents had normal sleep latency, with 73.3% falling asleep within 30 minutes. Sleep duration was suboptimal, as 37.7% slept less than 6 hours per night. Poor sleep efficiency was prevalent, with 77.8% reporting efficiency

below 65%. Sleep disturbances occurred in most participants, although sleep medication use was rare (95.6% never used). Daytime dysfunction was common, with 64.5% of respondents experiencing symptoms at least once per week. Overall, these findings indicate generally poor sleep quality among adolescent girls at Darul Hikmah Islamic Middle School.

Based on table related table 5 Duration /Length of Gadget Use and Status Anaemia, A significant association was found between the duration of gadget use and anaemia status among adolescent girls (ρ = 0.049). The highest proportion of anaemia was observed among participants who used gadgets for more than 6 hours per day (41.7%), whereas lower anaemia prevalence was found among those with shorter gadget use duration. Sleep quality was also significantly associated with anaemia status (ρ = 0.000). Anaemia was more prevalent among adolescents with poor sleep quality, particularly those with moderately poor sleep (33.3%) and mildly poor sleep (58.3%), while anaemia was least common among participants with good sleep quality. Overall, longer gadget use duration and poorer sleep quality were associated with a higher prevalence of anaemia among adolescent girls.

Table 4. Distribution PSQI Components for Young Women at Darul Hikmah Islamic Middle School

PSQI Components		n	%
Sleep Latency	< 15 minutes	18	40.0
	16 – 30 minutes	15	33.3
	31 – 60 minutes	9	20.0
	> 60 minutes	3	6.7
Sleep Duration	>7 Hours	12	26.7
	6 – 7 hours	16	35.6
	5 – 6 hours	11	24.4
	< 5 hours	6	13.3
Sleep Efficiency	≥ 85%	3	6.7
	75 – 84%	1	2.2
	65 – 74%	6	13.3
	< 65%	35	77.8
Sleep Disorders	n't any	20	44.4
	< 1x/ week	10	22.2
	1 – 2x/ week	11	24.4
	≥ 3x/ week	4	8.9
Use drug Sleep	Never	43	95.6
	1x/ week	1	2.2
	1 – 2x/ week	1	2.2
	≥ 3x/ week	0	0.0
Dysfunction Afternoon Day	Never	16	35.6
	1x/ week	14	31.1
	1 – 2x/ week	7	15.6
	≥ 3x/ week	8	17.8
	Total	**45**	**100**

Source: Primary Data, 2025

Based on Table 6 regarding connection between duration gadget usage and quality sleeping, No significant association was found between the duration of gadget use and sleep quality among adolescent girls (ρ = 0.500). Although a higher proportion of good sleep quality was observed among respondents who used gadgets for 1–3 hours per day (45.8%) compared to those who used gadgets for more than 3 hours per day (41.2%), poor sleep quality was still prevalent in both groups. These findings indicate that gadget use duration alone was not significantly associated with sleep quality in this study population.

Table 5. Analysis Correlation Between Duration/Length of Gadget Use and Quality Sleep with Anaemia Status in Adolescents Daughter

Variables		Anaemia Status				Total		*p-Value*
		Anaemia		No Anaemia				
		n	%	n	%	n	%	
Duration/length of gadget use	< 1 hour	3	12.5	7	33.3	10	22.2	0.049
	1 – 3 hours	6	25.0	9	42.9	15	33.3	
	4 – 6 hours	5	20.8	3	14.3	8	17.8	
	>6 hours	10	41.7	2	9.5	12	26.7	
Quality sleep (PSQI)	Good	1	4.2	14	66.7	15	33.3	0.000
	Mildly bad	14	58.3	5	23.8	19	22.2	
	Moderately bad	8	33.3	2	9.5	10	22.2	
	Very bad	1	4.2	0	0.0	1	2.2	

Source: Primary Data (Processed), 2025

Table 6. Analysis Correlation Between Duration / Length of Gadget Use with Quality Sleep in Adolescents Daughter

Duration/Length of Gadget Use	Sleep Quality				Total		*p-Value*
	Good		Bad				
	n	%	n	%	n	%	
1 – 3 hours	20	45.8	5	45.5	25	55.6	0.500
> 3 hours	14	41.2	6	54.5	20	44.4	

Source: Primary Data (Processed), 2025

DISCUSSION

According to WHO 2025, adolescent's daughter is one of the the group most affected by anaemia globally, especially in low-income countries low and medium (WHO, 2025b). Anaemia can cause various non- specific symptoms including fatigue, weakness, dizziness, drowsiness and shortness of breath, especially moment activity. Anaemia in adolescents can cause disturbance concentration, decrease performance study, disturb fitness and productivity and decline immunity (Kemenkes RI, 2022). Effects Long -term anaemia in adolescents' daughter can increase risk birth child with stunting status, which has an impact on growth flower physical and cognitive (Avnalurini et al., 2025).

Analysis Correlation Between Duration /Length of Gadget Use with Anaemia Status in Adolescents Daughter

The association between prolonged gadget use and anaemia among adolescent girls suggests that excessive screen time may function as an indirect behavioural risk factor for anaemia rather than a direct cause. Extended gadget use, particularly for entertainment, has been consistently linked to sedentary lifestyles and unhealthy dietary behaviours, including irregular meal patterns, increased consumption of energy-dense but micronutrient-poor snacks, and reduced intake of iron-rich foods, fruits, and vegetables (Nagata et al., n.d.). These dietary changes may result in inadequate intake of iron, folate, vitamin B12, and vitamin C, which are essential for erythropoiesis and iron absorption, thereby increasing the risk of nutritional anaemia. The relevance of these findings to adolescent anaemia prevention programs is substantial. Current interventions primarily emphasize iron supplementation and nutrition education, yet behavioural factors such as screen-time habits are often overlooked. Integrating screen-time management with dietary education may strengthen anaemia prevention strategies, particularly among adolescent girls who have increased iron requirements due to growth and menstruation and often demonstrate low adherence to iron supplementation programs. (Nisa et al., n.d.)

From a public health perspective, schools represent a strategic setting for promotive and preventive interventions. School-based programs can incorporate digital literacy education to promote responsible gadget use, reinforce healthy eating behaviours, and improve compliance with weekly iron supplementation. Such integrated approaches may enhance the effectiveness of anaemia prevention efforts and contribute to improved adolescent health outcomes.(Maghfirah et al., 2024)

Analysis Correlation Between Quality Sleep with Anaemia Status in Adolescents Daughter

The significant association between poor sleep quality and anaemia among adolescent girls indicates that sleep plays an important role in hematological health during adolescence. Sleep disturbances may contribute to anaemia through several biological mechanisms. Inadequate or poor-quality sleep can increase oxidative stress, which accelerates erythrocyte breakdown and shortens red blood cell lifespan. In addition, sleep disruption may impair hormonal regulation, particularly reducing erythropoietin secretion, a key hormone involved in red blood cell production. These physiological alterations may ultimately lead to decreased hemoglobin levels and increased susceptibility to anaemia (Kesehatan et al., n.d.; Woran et al., n.d.).

The findings of this study are consistent with previous research conducted among adolescent girls in different settings, which reported a significant association between poor sleep quality and increased anaemia risk (Rosdiana & Suryani, 2025; (Gucie et al., 2024). Adolescence is characterized by heightened vulnerability to anaemia due to rapid growth, menstrual blood loss, and increased nutritional demands. When poor sleep quality coexists with other risk factors such as inadequate dietary intake and low physical activity, the likelihood of anaemia may further increase. (Kalsum et al., n.d.) These results highlight the importance of incorporating sleep health into adolescent anaemia prevention programs. While current interventions largely focus on nutrition and iron supplementation, sleep

quality remains an often-overlooked determinant of anaemia risk. Addressing sleep hygiene may enhance the effectiveness of existing preventive strategies. Schools represent a critical platform for promotive and preventive public health interventions. School-based programs can integrate sleep health education, promote regular sleep schedules, and raise awareness of the physiological importance of adequate sleep alongside nutrition education and iron supplementation programs. Such integrated, school-based approaches may contribute to reducing anaemia prevalence and improving overall health and academic performance among adolescent girls.

Analysis Correlation Between Duration / Length of Gadget Use with Quality Sleep in Adolescents Daughter

The absence of a statistically significant association between gadget use duration and sleep quality suggests that screen time alone may not be a sufficient determinant of sleep problems among adolescent girls. Sleep quality in adolescents is influenced by multiple interacting factors, including academic workload, psychosocial stress, household environment, and individual sleep hygiene practices. As a result, the effect of gadget use duration may be diluted when these confounding factors are not fully controlled, which is consistent with findings from previous studies conducted among university students and adolescents in different cultural settings. (Bin Laeto et al., 2022; Liebig et al., 2023).

Despite the lack of a significant statistical relationship, a descriptive tendency toward poorer sleep quality with longer gadget use was observed. This pattern may reflect the behavioral impact of prolonged gadget use, such as delayed bedtime, increased cognitive stimulation, and exposure to blue light emitted from digital screens, which can suppress melatonin secretion and disrupt circadian rhythms. These mechanisms have been proposed as pathways through which excessive gadget use may impair sleep quality, particularly when use occurs during the evening or before bedtime (Ivana & Rochmah Ida Ayu Trisno Putri, 2021).

From a public health perspective, these findings remain relevant for adolescent anaemia prevention programs. Although gadget use duration was not directly associated with sleep quality, prolonged screen time may still contribute indirectly to anaemia risk by promoting poor sleep hygiene and unhealthy lifestyle behaviours. Poor sleep quality has been linked to physiological disturbances that affect erythropoiesis and haemoglobin regulation, thereby increasing susceptibility to anaemia. Schools offer a strategic platform for promotive and preventive interventions targeting these interconnected behaviours. School-based programs can incorporate education on healthy screen-time habits, sleep hygiene, and balanced daily routines alongside nutrition education and iron supplementation initiatives. Such integrated approaches may help mitigate anaemia risk and support overall adolescent health and academic performance.

CONCLUSIONS

This study demonstrates that lifestyle factors are closely related to anaemia among adolescent girls. Prolonged gadget use was associated with anaemia status, while poor sleep quality showed a strong relationship with anaemia occurrence. Although gadget use duration

was not directly associated with sleep quality, extended screen time may indirectly increase anaemia risk through unfavourable behavioural pathways, including poor dietary habits and inadequate sleep hygiene. These findings indicate that anaemia among adolescent girls is not solely a nutritional problem but is also influenced by modifiable behavioural and lifestyle factors linked to digital technology use.

Digital behaviour, particularly prolonged and entertainment-oriented gadget use, should be recognized as a modifiable risk factor in adolescent anaemia prevention strategies. School-based interventions are urgently needed to address this issue through integrated promotive and preventive programs. Schools should implement education on responsible gadget use, sleep hygiene, and healthy eating behaviours alongside existing iron supplementation and nutrition education programs. Collaboration between schools, health workers, and families is essential to reinforce behaviour change and ensure sustainability. Strengthening school-based interventions that integrate digital behaviour management with anaemia prevention efforts may significantly reduce anaemia risk and improve overall health outcomes among adolescent girls.

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REFERENCE

Avnalurini, S., Patimah, S., Mahmud, U., & Jayanti, I. (2025). Identify The Type and Cause of Anaemia in Pregnant Women by Examining Peripheral Blood Smears. *Multidisciplinary Science Journal*, 1–6. Https://Doi.Org/Http://Dx.Doi.Org/10.31893/Multiscience.2025280

Central Bureau of Statistics. (2024). *Indonesian Telecommunication Statistics 2023.* Central Bureau of Statistics.

Bin Laeto, A., Sarahdeaz Fazzaura Putri, S., Febri Zulissetiana, E., Bin Laeto Siti Sarahdeaz Fazzaura Putri Eka Febri Zulissetiana Swanny Faculty Medicine, A., History Article, D., & Key, K. (2022). *Relationship Sleep Quality of Adolescents During the Covid-19 Pandemic with Activity Physical and Screen-Time*.

Duration Use Gawai, H., Stress, T., Gender, J., Residence with Eating Patterns, and, Residence with Eating Patterns of Jember Adolescents Wardasaidah Alfain Rohim Nutrition, D. Di, & Science Sports and Health, F. (ND). *Cleonara Yanuar Dini*.

Gucie , N.A., Destani Sandy, Y., Mutiara, E., & Haryana, NR (2024). *Connection Sleep Quality and Nutritional Status with Anaemia Incidence in Vocational High Schools Pharmaca Medan*. https://Journal.Unnes.Ac.Id/Sju/Index.Php/Nutrizione/

Ivana, I., & Rochmah Ida Ayu Trisno Putri, N. (2021). The Relationship Between Gadget Usage and Adolescent Sleep Quality. In *The Relationship Between Gadget Usage and Adolescent Sleep Quality. Jphtcr* (Vol. 4, Issue 1).

Kalsum, U., Mayangsari, R., Qlifianti Demmalewa, J., College of Health Sciences Health Works, S., Key, K., Fe, A., Sleep Correspondence Author Umi Kalsum, K., Gizi, P., & Health Works Jln Dock Lapulu Abeli District, Kendari City, Stik. (ND). *Relationship Fe Intake and Sleep Quality with the Incidence of Anaemia in Adolescent Girls at Sman 2 Wawotobi Regency Konawe*. Https://Jurnal.Karyakesehatan.Ac.Id/Jgi

Ministry of Health of the Republic of Indonesia. (2014). *Regulation of the Minister of Health of the Republic of Indonesia Number 25 of 2014 concerning Child Health Efforts*.

Ministry of Health of the Republic of Indonesia. (2018). *National Report on Basic Health Research 2018*.

Ministry of Health of the Republic of Indonesia. (2022). *Technical Guidelines for the Management of Anaemia in Adolescent Girls Through Iron Supplement Tablets*. Directorate of Nutrition, Directorate General of Public Health, Ministry of Health of the Republic of Indonesia.

Ministry of Health of the Republic of Indonesia. (2024). *Indonesian Health Survey 2024 2023: Portrait of a Healthy Indonesia*. Ministry of Health of the Republic of Indonesia.

Health, J., Meditory , S., Lestari, S., Arif, A., Riski , M., Zuitasari, A., Midwifery, PS, Kader, U., Palembang, B., Program, M., & Midwifery, S. (ND). *Related Factors with the Incidence of Anaemia in Adolescent Girls Aged 13-14 Years in a Boarding School Al- Amalul Khair Islamic Boarding School, Palembang City Factors Related to the Incident of Anaemia in Adolescent Girls Aged 13-14 Years at the Al- Amalul Khair Islamic Boarding School Dormitory Palembang City* . Https://Jurnal.Syedzasaintika.Ac.Id

Ministry of Communication and Information of the Republic of Indonesia (2023). *Status of Digital Literacy in Indonesia 2022* .

Liebig, L., Bergmann, A., Voigt, K., Balogh, E., Birkas , B., Faubl, N., Kraft, T., Schöniger , K., & Riemenschneider, H. (2023). Screen Time And Sleep Among Medical Students In Germany. *Scientific Reports* , *13* (1). https://Doi.Org/10.1038/S41598-023-42039-8

Maghfirah , N., Masfufah Masfufah & Nuristha Febrianti . (2024). Screen Time and Sleep Quality with Hemoglobin Levels in Adolescent Girls. *Vitamins: Journal General Health Sciences* , *3* (1), 01–09. Https://Doi.Org/10.61132/Vitamin.V2i4.730

Nagata, J.M., Weinstein, S., Bashir, A., Lee, S., Abubakr , ; , Al- Shoaibi , AA, Iris, ;, Shao, Y., Ganson, KT, Testa, ; Alexander, He, J., Garber, AK, Nagata, J.M., Weinstein, S., Bashir, A., Lee, S., Al- Shoaibi , A., Shao, IY, & Garber, AK (ND). *Associations Of Contemporary Screen Time Modalities With Early Adolescent Nutrition* .

National Sleep Foundation. (2020). *National Sleep Foundation Highlights New Evidence For Screen Time Usage And Poor Sleep [Internet]. 2020 Dec 1 [Cited 2025 Jun 18]. Available From: Https://Www.Thensf.Org/National-Sleep-Foundation-Highlights-New-Evidence-For-Screen-Time-Usage-And-Poor-Slee* . Www.Thensf.Org /National-Sleep-Foundation-Highlights-New-Evidence-For-Screen-Time-Usage-And-Poor-Sleep/

Nisa, J., Maulidya Chikmah , A., & Arsita Harnawati , R. (ND). *The Effects Of Gadgets On The Occurrence Of Anaemia In Teenage Girls* . https://Doi.Org/10.30591/Siklus.V9i1.1653.G1082

Ouyang, J., Peng, Y., & Gong, Y. (2022). *New Perspectives On Sleep Regulation By Tea: Harmonizing* . 1–20.

Pangarkar, T. (2025). *Mobile Internet Usage Statistics 2025 By Best Network Technology* . Https://Scoop.Market.Us/Mobile-Internet-Usage-Statistics/

Patimah, S., Masriadi, Abbas, HH, & Sharief, SA (2025). Exploration Of Strategies to Overcome Dual-Triple Burden of Malnutrition in Adolescent Girls Based on Local Wisdom: A Qualitative Study. *Window Of Health*, *8* (1), 59–72. Https://Doi.Org/Https://Doi.Org/10.33096/Woh.V8i1.2601

Rah, J. H., Melse-Boonstra, A., Agustina, R., Zutphen, K. G. Van, & Kraemer, K. (2021). *The Triple Burden of Malnutrition Among Adolescents in Indonesia*. *42*, 4–8. https://Doi.Org/10.1177/03795721211007114

Rosdiana, R., & Suryani, L. (2025). Relationship Sleep Quality with Risk of Anaemia in Adolescent Girls: A Cross-Sectional Study in Pekanbaru State Umbrella Health Institute. *Jubida*, *4* (1), 133–151. https://Doi.Org/10.58794/Jubida.V4i1.1524

Sharief, SA, & M, A. (2019). Comparison Administration of Fe Tablets + Vitamin A and Fe Tablets + Folic Acid to Increased Hemoglobin Levels. *Journal Forikes Voice Health Research*, *10* (1), 219–222. Https://Doi.Org/Doi: Http://Dx.Doi.Org/10.33846/Sf10312

Sharief, SA, & M., A. (2021). Eating Habits and the Incidence of Anaemia. *Journal Health Research Voice Forikes*, *12* (2013), 168–172. Https://Doi.Org/Doi: Http://Dx.Doi.Org/10.33846/Sf12nk131

Who. (2025a). *Anaemia: Key Facts*. Https://Www.Who.Int/News-Room/Fact-Sheets/Detail/Anaemia

Who. (2025b). *Who Global Anaemia Estimates, 2025 Edition: Global Anaemia Estimates in Women 15–49 Years, By Pregnancy Status*.

Woran, K., Kundre, RM, Pondaag, FA, Science Study Program Nursing, M., Medicine, F., Sam Ratulangi, U., & Science Studies Nursing Faculty Sam Ratulangi University of Medicine, P. (ND). Analysis Connection Use of Social Media with Sleep Quality in Adolescents. In *Journal Nursing (JKP)* (Vol. 8, Issue 2).

World Health Organization and United Nations Children's Fund (Unicef). (2024). *Best Practices for Anaemia Surveys in Population-Level Hemoglobin Measurement Technical Brief*.