



Obesogenic lifestyles and sustainable health: The role of nursing in advancing environmentally responsible behaviors

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ABSTRACT

Background: The health behaviors of Indonesians still tend to be obesogenic, which negatively affects both health and environmental sustainability. This study aims to analyze obesogenic behaviors among Indonesians within an ecological and environmentally behaviors framework, as well as to explore the role of nurses in promoting sustainable health. **Methods:** This study employed a quantitative descriptive analysis using secondary data from Book 3B of the Indonesian Family Survey Wave 5 (IFLS-5). **Findings:** Most respondents were adults (79.5%), female (52.3%), and married (71.1%). Only 22% of respondents engaged in vigorous physical activity, while walking was the most common activity (69.8%), but with a short daily duration. Dietary pattern showed a high frequency of obesogenic food consumption, such as fried foods (57.1%) and sweet foods (56.5%), whereas fruit consumption was relatively low (24.3%). Additionally, 21.8% of respondents sometimes experienced sleep disturbances, and 9.7% rated their sleep quality as poor. These findings indicate the influence of social and environmental factors that shape obesogenic behaviors and contribute to increased carbon emissions and food waste. **Conclusion:** The health behaviors of the Indonesian population need to be strengthened through an ecological approach and education that promotes environmentally sustainable behaviors. Nurses play a strategic role as educators and advocates in integrating health with environmental sustainability. **Novelty/Originality of this Article:** This article integrates Bronfenbrenner's ecological theory into the analysis of health behaviors and connects it to issues of environmental sustainability, highlighting the role of nurses as agents of change in promoting healthy and environmentally sustainable behaviors.

KEYWORDS: eco-friendly behaviors; environmental sustainability; obesogenic behaviors.

1. Introduction

Obesity remains one of the major challenges in the health sector, as showed by its increasing incidence each year. In fact, obesity not only elevates the risk of disease but also has significant social and economic impacts, including reduced work productivity, lower cost-effectiveness of care, diminished quality of life, and stigma that can lead to psychological distress (Artime et al., 2025; Hecker et al., 2022; Timkova et al., 2025; Westbury et al., 2023). The global prevalence of obesity has risen to approximately 16%, marking a more than twofold increase since 1990 (World Health Organization, 2025). A similar trend has been observed in Indonesia, where the prevalence of obesity increased by 6.2% within a single year, rising from 12.2% to 18.5%—a rate that exceeds the global average (Kementerian Kesehatan Republik Indonesia, 2024a, 2025). These findings indicate

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that obesity prevention and control programs have not yet achieved optimal results. Furthermore, these findings highlight that obesity is no longer merely an individual health issue that can be addressed through personal behavior changes, such as dietary control and physical activity, but rather one that requires integration with broader socioeconomic and environmental factors (Gapińska et al., 2024; Howell & Booth, 2022; Samsury et al., 2025).

This broader perspective can be understood through Bronfenbrenner's Ecological Theory, which posits that human behavior is shaped by dynamic interactions between individuals and multiple layers of their environment, including the microsystem, mesosystem, exosystem, and macrosystem (Bronfenbrenner, 1979). Within this framework, health-related behaviors are not solely determined by individual choices but are also influenced by family relationships, social networks, community characteristics, institutional structures, and broader sociocultural and policy contexts. Consequently, obesity and its associated behaviors should be viewed as outcomes of complex interactions between personal, social, and environmental factors rather than as the result of individual responsibility alone.

Building on Bronfenbrenner's ecological perspective, Swinburn et al., (1999) developed the concept of the obesogenic environment using an ecological model approach to analyze multiple dimensions. The ANGELO framework identifies four interrelated environmental dimensions that influence obesity: physical, economic, political, and sociocultural (Swinburn et al., 1999). Recent studies confirm that urban environments with pedestrian-friendly infrastructure and green open spaces play an important role in promoting physical activity and, consequently, reducing the risk of diabetes (Althoff et al., 2025; Wang et al., 2023). Simultaneously, food accessibility and affordability emerge as critical determinants, ranging from the availability of inexpensive and easily accessible fast food, which increases excess energy consumption, to limited access to fresh produce markets, which constrains individuals' ability to adopt healthy eating patterns (Pineda et al., 2024; Scapin et al., 2025).

In addition, structural and cultural factors further reinforce obesogenic behaviors. Lan & Sulaiman (2024) confirms that comprehensive obesity policies can reduce obesity prevalence by promoting healthy eating patterns, improving nutritional status, lowering the risk of chronic diseases, decreasing healthcare costs, and reducing health disparities among vulnerable populations. Social shifts toward modern consumption patterns also exacerbate the situation, driven by urbanization, modernization, and cultural transitions that heighten the risk of obesity. These changes are closely associated with increased fast-food consumption and sedentary lifestyles (Jalilzadeh & Goharinezhad, 2025). Consequently, the obesogenic environment not only exacerbates health risks but also poses long-term implications for the sustainability of public health.

The transformation of obesogenic environments triggers risky behaviors that lead to obesity (obesogenic behaviors), further exacerbating ecosystem degradation. The consumption of ultra-processed foods not only increases the risk of obesity but also generates high carbon emissions, massive plastic waste, and unsustainable exploitation of natural resources (García et al., 2023; Mambrini et al., 2023; Vellinga et al., 2023). A two-year longitudinal study confirmed that ultra-processed food (UPF) consumption influences greenhouse gas emissions and land use (García et al., 2023). Another study shows that UPFs contribute to approximately 50% of the total impact of climate change, as well as increased land use and greenhouse gas emissions (Dénos et al., 2024). This evidence reinforces the interconnection between obesity and the sustainable development agenda. However, research explicitly linking obesogenic behaviors with environmentally unsustainable behaviors, as well as examining the role of nurses in advocating for sustainability, remains very limited in Indonesia. This creates a significant knowledge gap in developing holistic and sustainable nursing interventions.

This present study aims to examine patterns of obesogenic behavior using data from the Indonesian Family Life Survey (IFLS-5) and to discuss the strategic role of nurses in promoting environmentally friendly behaviors that simultaneously address obesity and support the Sustainable Development Goals (SDGs). This is the first study in Indonesia to

integrate an analysis of obesogenic behaviors based on national population data with an environmental sustainability perspective and the role of nursing. This approach is expected to contribute both theoretically and practically to the development of holistic, evidence-based nursing interventions oriented toward achieving health sustainability in Indonesia.

2. Methods

2.1 Research design

This study applied a quantitative descriptive analysis using secondary data derived from the Indonesian Family Life Survey (IFLS) Wave 5. IFLS-5 is a nationally recognized longitudinal survey conducted by RAND Health (2014) in collaboration with Indonesian research partners during the 2014–2015 period. The IFLS was selected as the primary data source because of its methodological rigor, extensive sample coverage, and relevance to the study's focus. Specifically, IFLS-5 captures approximately 83% of the Indonesian population, making it one of the most comprehensive household surveys available in the country. Its data encompass a wide range of indicators related to demographic, socioeconomic, environmental, and health behaviors, including variables closely associated with the concept of an obesogenic environment. Thus, the IFLS-5 dataset provides a robust foundation for investigating behavioral factors such as diet, physical activity, and sleep patterns in the Indonesian population.

2.2 Location and population

The study was conducted using data collected across 13 provinces in Indonesia that fall within the IFLS-5 sampling frame. These provinces represent a diverse cross-section of the Indonesian population in terms of geography, socioeconomic status, urban–rural distribution, and cultural characteristics. The analytical sample consisted of adolescents aged above 10 years who had complete and valid responses for all study variables. The selection of this age group aimed to capture a broader representation of lifestyle behaviors during a critical developmental stage when obesogenic habits often begin to form. Inclusion in the analysis required completeness of data on physical activity, dietary habits, sleep quality, and demographic characteristics. Respondents with missing or incomplete information were excluded from the relevant analyses, following the principles described in the data management section.

2.3 Research variables

Demographic characteristics, specifically age, gender, and marital status, were described to provide a contextual overview of the study population. These variables were included for descriptive purposes only, without adjusting or balancing respondent distribution. The core study variables were selected based on the components of obesogenic behavior identified by the World Health Organization, which include physical activity, dietary intake, and sleep patterns. Physical activity was measured based on the frequency of activities performed in the previous seven days. The mean value was used as the cutoff point to categorize respondents into higher and lower activity groups. Dietary behavior was assessed through the frequency of consuming specific food items. Food consumption was grouped into two categories: “rare” (<3 times) and “often” (≥3 times), based on the number of times particular foods were consumed within the recall period. Sleep-related variables included sleep disturbances and perceived sleep quality, both of which were assessed using items available in the IFLS-5 dataset. These variables were chosen to reflect behavioral risk factors contributing to an obesogenic environment, consistent with global public health frameworks.

2.4 Data analysis

Data analysis was conducted through a multistage process. First, raw data were imported into the analysis system, followed by restructuring key variables—physical activity, sleep disturbances, sleep quality, and food consumption frequency. Variable restructuring was performed using the wide-to-long transformation principle in PDLINK to ensure that each row appropriately represented individual-level responses across multiple time points or question sets. Following restructuring, a data cleaning process was conducted to address incomplete responses. Missing values were recoded with the value “999,” which was designated as missing and automatically excluded from subsequent analyses. This step enhanced the accuracy and reliability of the findings by ensuring that only valid data were included in descriptive calculations.

Descriptive statistical analyses were then performed to summarize the distribution of respondents’ health behaviors. These analyses included frequency distributions, percentages, and descriptive summaries of physical activity levels, eating patterns, sleep disturbances, and subjective sleep quality. All data processing and statistical calculations were performed using SPSS software. A case-by-case analytical approach was applied, allowing the number of respondents (N) to vary across different variables depending on data completeness and the skip patterns embedded in the IFLS questionnaire structure..

3. Results and Discussion

3.1 Characteristics

The number of respondents included in the analysis varied across categories, depending on the completeness of data available in each IFLS-5 module. Data extracted from Book 3B of IFLS-5 indicate that the majority of respondents were adults (79.5%), female (52.3%), and married (71.1%). These demographic characteristics provide an overview of the population profile represented in this study and reflect the broader composition of participants captured in the Indonesian Family Life Survey Wave 5. The predominance of adult, female, and married respondents is consistent with the survey’s household-based sampling design, which tends to capture individuals with stable residency and established family structures. This demographic distribution offers important context for interpreting the health behavior patterns analyzed in subsequent sections of this study.

3.2 Physical activity in the context of ecology and environmentally friendly behavior

As shown in Table 1, physical activity patterns among Indonesian adults exhibit substantial variation across activity types. There is only about 22% of respondents engaged in vigorous physical activity during the past seven days, while 78% did not engage in any vigorous activity. In contrast, moderate-intensity physical activity was more evenly distributed, performed by 55.9% of respondents compared to 44.1% who reported never engaging in it. Walking activity emerged as the most frequently reported, undertaken by 69.8% of respondents. This finding shows that lower-intensity activities are more readily integrated into daily routines.

Patterns of daily duration further reinforce these differences. Across all activity types, most respondents reported spending less than two hours per day on physical activity. This included 50.1% for vigorous activity, 71.1% for moderate activity, and 78.4% for walking activity. These findings indicate suggest that many adults engage in physical activity, although the time they spend remains relatively short for all intensity categories.

Regarding frequency, activity patterns showed considerable variation: vigorous activities were generally performed less than four days per week (55.4%), while moderate activities and walking tended to occur more regularly. These findings indicate that the overall level of physical activity among Indonesians remains low to moderate, particularly in terms of daily duration. This aligns with the findings of Lubis et al. (2023) and Tutiany et

al. (2022), who reported that in Indonesia, the proportion of individuals engaging in low to moderate physical activity is higher than those performing vigorous activity. Similarly, among adolescents, only about one-third of girls (35%) and boys (37%) meet the recommended physical activity levels (Niswah et al., 2021).

Low levels of physical activity may reflect lifestyle transitions that are increasingly dominated by sedentary behaviors. These shifts are shaped by multiple structural and social influences, including rapid urbanization, limited supportive infrastructure, and growing time constraints. Bronfenbrenner's ecological theory explains that individual behavior is shaped through dynamic interactions across multiple environmental layers. In daily life, physical activity is strongly affected by social support from close contacts such as family members, friends, and coworkers. When the social environment does not provide encouragement or opportunities for shared activity, motivation to engage in physical activity tends to decline (Curran et al., 2023; Silveira et al., 2022). This is consistent with findings from the Indonesian Health Survey, which reported that 9.5% of respondents did not engage in physical activity due to the absence of companions to exercise with (Kementerian Kesehatan Republik Indonesia, 2024b).

Table 1. Overview of physical activity in Indonesia based on IFLS-5 data

Variable	Vigorous activity		Moderate activity		Walking	
	N	%	N	%	N	%
Engaged in activity during the past 7 days						
Yes	6,927	22	17,578	55.9	21,948	69.8
No	24,537	78	13,885	44.1	9,515	30.2
Duration activity per day						
< 2 hours	3,470	50.1	12,503	71.1	16,410	74.8
≥ 2 hours	3,456	49.9	5,075	28.9	5,538	25.2
Frequency of activity during the past 7 days						
< 4 days	3,835	55.4	8,113	46.2	7,562	34.5
≥ 4 days	3,091	44.6	9,465	53.8	14,386	65.5

Note: The number of respondents (N) for each variable varies due to missing data and questionnaire filtering process

Beyond interpersonal influences, broader environmental layers and residential characteristics further contribute to variations in physical activity patterns. Rey-Brandariz et al., (2023) found that physical activity levels are lower among urban populations (55.3%) compared to those living in semi-urban (59.9%) and rural (66.7%) areas. Lotfata & Georganos, (2024) further emphasized that accessible green open spaces can significantly increase community participation in physical activity. Environmental barriers such as air pollution ($p < 0.001$), hot and humid weather ($p = 0.009$), limited time ($p < 0.001$), and concerns about environmental safety ($p < 0.001$) also hinder engagement in physical activity (Koh et al., 2022). National data reflect similar trends, indicating that nearly half of the population (48.7%) cites lack of time as the primary reason for not engaging in physical activity (Kementerian Kesehatan Republik Indonesia, 2024b). These findings demonstrate that ecological barriers operate across both personal and societal levels.

Addressing these barriers is therefore an important consideration for public health and urban planning. The ongoing process of urbanization can be leveraged to promote physical activity through the development of facilities that support active transportation, such as walking and cycling, rather than continued dependence on motorized transportation. Active transportation represents an important intersection between health promotion and environmental sustainability. These forms of physical activity contribute to higher daily energy expenditure and increased overall physical activity, thereby supporting weight management and reducing the risk of obesity and other non-communicable diseases (Lorenzo et al., 2020; Mizdrak et al., 2023; Muñoz-Urtubia et al., 2024). In addition, replacing motorized travel with active modes of transportation can substantially reduce greenhouse gas emissions, air pollution, and fossil fuel consumption, generating both health and environmental co-benefits (Brand et al., 2021; Mizdrak et al., 2020; Zukowska et al., 2022).

Within Bronfenbrenner's ecological framework, opportunities for active transportation are strongly influenced by broader environmental and policy contexts. The availability of safe pedestrian pathways, bicycle infrastructure, public transportation systems, and walkable neighborhoods can facilitate greater engagement in daily physical activity (Zukowska et al., 2022). Conversely, urban environments that prioritize private vehicle use may discourage active movement and contribute to sedentary lifestyles (Sallis et al., 2016; Westenhöfer et al., 2023). These environmental characteristics reflect the influence of exosystem and macrosystem factors, where public policies, urban planning, and transportation systems indirectly shape individual health behaviors. At the same time, support from family members, peers, and workplace represent microsystem influences that may either facilitate or hinder participation in active transportation and other forms of physical activity. Therefore, efforts to increase physical activity should extend beyond individual behavior change and include environmental and policy interventions that create supportive conditions for active and sustainable living.

The accumulation of these social and environmental pressures contributes to the formation of an obesogenic environment, a condition that promotes behaviors increasing the risk of obesity (Swinburn et al., 1999). These obesogenic behaviors not only affect individual health but also reinforce environmentally harmful practices, including increased energy consumption for transportation and dependence on motorized vehicles that emit carbon. Conversely, environmentally harmful damaging condition, such as rising extreme temperatures and urban environmental degradation, can further reinforce obesogenic behaviors by discouraging physical activity and encouraging the use of more convenient but less active modes of transport. These interconnected dynamics contribute to increasing greenhouse emissions (Koch et al., 2021; Scheen, 2025). The transportation sector alone accounts for approximately 14% of total global greenhouse gas emissions (Koch et al., 2021).

Within the context of this study, walking is identified as the most frequently performed form of physical activity. However, its relatively short duration indicates that its overall contribution to reducing carbon emissions and promoting environmental sustainability remains limited. These findings also demonstrate that physical activity is closely linked to ecological conditions and environmentally friendly behaviors. Viewing physical activity through an ecological lens highlights the importance of integrated strategies that address both social and environmental determinants. Increasing opportunities for active transportation may therefore serve as a practical approach to simultaneously improve population health and environmental sustainability. Encouraging individuals to incorporate walking and cycling into their daily routines has the potential to increase physical activity levels while reducing reliance on carbon-intensive transportation. Such interventions can generate long-term benefits by creating healthier communities, lowering healthcare burdens associated with obesity and non-communicable diseases, and supporting broader climate mitigation efforts. This underscores the dual benefit of creating environments that actively facilitate physical activity while simultaneously advancing environmental sustainability.

3.3 Food consumption behavior from an ecological and environmentally sustainable perspective

The results presented in Table 2 show distinct patterns in the consumption of local and health food types among Indonesian adults. Vegetables constitute the most frequently consumed food type, with 72.7% of respondents reporting regular intake. Fish consumption is also relatively high, with 54.7%, reflecting the prominence of fish as an accessible protein source in many regions. Similarly, dairy products such as milk and cheese are consumed frequently by 57.1% of respondents, reflecting a broader pattern of diverse food consumption within the population. These patterns indicate that many people regularly include nutrient-rich foods in their diet, which may be influenced by cultural eating habits and awareness of balanced nutrition.

Table 2. Overview of food consumption behaviors in Indonesia based on IFLS-5

Food Type	Frequency			
	Rarely		Often	
	N	%	N	%
Sweet potato	9,207	83.2	1,854	16.8
Egg	13,177	50.7	12,811	49.3
Fish	10,754	42.6	14,489	57.4
Milk, cheese, etc	4,258	42.9	5,669	57.1
Vegetable	7,561	27.3	20,098	72.7
Fruits	19,681	75.1	4,787	24.3
Meat (beef, chicken, etc.)	12,706	64.6	6,975	35.4
Instant Noodle	12,717	61.5	7,971	38.5
Fast Food	2,879	82.0	631	18.0
Soft drink	4,725	77.0	1,408	23.0
Fritters/ fried snacks	8,789	42.9	11,677	57.1
Sweet food	7,214	43.5	9,355	56.5

Note: The number of respondents (N) for each variable varies due to missing data and questionnaire filtering process

In contrast, the consumption of foods associated with elevated obesity risk remains considerable. Fried foods constitute one of most frequently consumed items, with 57.1% of respondents reporting regular intake, followed by sweet foods at 56.5%. The frequent consumption of soft drinks (23.0%) and instant noodles (38.5%) further indicates a high intake of energy-dense, nutrient-poor foods in daily diets.

These findings are consistent with the results of Syauby et al. (2025) who reported that 62% of 154,449 Indonesians frequently consume fried foods, 66.4% consume sweet foods, and 97.3% consume ultra-processed foods. Similarly, a study by Lowe et al., (2021) in rural Central Java supports these findings, showing that 39% of households experience dual malnutrition, with dietary patterns dominated by processed foods, high-fat foods, and sweetened beverages, patterns that are increasingly observed even among children.

This consumption pattern reflects an ongoing nutritional transition in Indonesia, characterized by a growing preference for ultra-processed foods and food preparation methods that elevate the risk of obesity. Nurhasan et al. (2024) highlight this trend by reporting a significant increase in the consumption of ultra-processed and ready-to-eat foods. Dietary quality has declined in all regions, with the most rapid deterioration occurring in urban area settings. These areas are marked by reduced dietary diversity, decreased consumption of nutrient-rich foods, and increasing intake of unhealthy and ultra-processed products (Nurhasan et al., 2024).

This dietary shifts are closely intertwined with broader cultural and modernization processes that have expanded access to fast food and convenience-oriented products. Fast food is increasingly perceived as practical and time-efficient, particularly for individuals with limited time for food preparation (Jayasinghe et al., 2025). In low- and middle-income settings, people also tend to favor simple foods that can be prepared in advance and stored for extended periods (Kenney et al., 2024). The rising tendency to purchase ready-made meals rather than prepare traditional home-cooked dishes further reinforces obesogenic eating patterns (Kenney et al., 2024). These findings suggest that dietary behaviors are not merely individual choices but are strongly influenced by broader social, economic, and environmental contexts that shape food availability, accessibility, and convenience.

From Bronfenbrenner's ecological perspective, dietary behaviors emerge through dynamic interactions across multiple environmental systems (Bronfenbrenner, 1979). At the microsystem level, food preferences are strongly influenced by family eating habits, household food availability, and peer norms (Granheim et al., 2022). At the exosystem level, food marketing, food retail environments, and workplace conditions may indirectly influence food choices by determining the accessibility and convenience of particular foods (Granheim et al., 2022; Shaw et al., 2023). Meanwhile, macrosystem factors, including cultural norms, economic development, globalization, and food policies, contribute to

broader dietary transitions within society (Gaupholm et al., 2023; Shaw et al., 2023). These interconnected influences help explain why obesogenic dietary patterns persist even when individuals possess adequate knowledge regarding healthy nutrition (Pineda et al., 2024).

Understanding dietary behaviors from an ecological perspective highlights the need for interventions that extend beyond individual behavior change. Similar to active transportation in the context of physical activity, sustainable diets represent an important intersection between human health and environmental sustainability. Sustainable diets emphasize the consumption of nutritionally adequate foods while minimizing the environmental impacts associated with food production, distribution, and consumption (Alexandropoulou et al., 2022). Dietary patterns characterized by higher consumption of fruits, vegetables, whole grains, and other minimally processed foods are generally associated with lower environmental footprints and improved health outcomes (Arrieta & Aguiar, 2023). In contrast, dietary patterns dominated by ultra-processed foods are associated with greater environmental burdens due to intensive processing, packaging, transportation, and resource use throughout the food supply chain (Liyanapathirana et al., 2023; Northcott et al., 2023). Consequently, promoting sustainable dietary patterns may simultaneously contribute to obesity prevention and environmental sustainability goals.

The shift toward ultra-processed food consumption also has broader implications for environmental sustainability. The production, processing, and distribution of ultra-processed foods require substantial energy inputs and generate considerable carbon emissions and plastic packaging waste (Clark et al., 2020). Supporting this, García et al. (2023) demonstrate that long-term consumption of ultra-processed foods is associated with higher greenhouse gas emissions, increased land use, and greater water and energy demands. In addition, inefficiencies throughout the food supply chain—including storage, processing, packaging, distribution, and retail activities—contribute to increased food waste generation (Koch et al., 2021). As a result, obesogenic food environments may not only promote unhealthy dietary behaviors but also encourage excessive consumption patterns that place additional pressure on environmental resources.

Environmental changes, such as rising extreme temperatures and declining urban environmental quality, may also reinforce obesogenic dietary patterns. For instance, Koch et al. (2021) note that extreme heat can disrupt food supply systems and indirectly shape dietary choices. At the same time, deteriorating environmental conditions may reduce opportunities for physical activity, thereby strengthening multiple obesogenic behaviors simultaneously. These findings illustrate the bidirectional relationship between environmental degradation and obesogenic lifestyles, whereby unhealthy dietary practices contribute to environmental impacts while environmental changes further reinforce unhealthy behaviors.

Overall, these findings demonstrate that obesogenic consumption patterns are deeply embedded within the broader nutritional transition occurring in Indonesia. The interplay between dietary behavior, structural influences, and environmental change illustrates that food consumption is not only a matter of individual preference but also part of a larger ecological system. Promoting sustainable dietary practices may therefore represent a practical strategy for simultaneously addressing obesity and environmental sustainability. Encouraging greater consumption of fruits, vegetables, fish, and locally produced foods while reducing reliance on ultra-processed products has the potential to improve dietary quality and reduce environmental burdens associated with modern food systems. Such approaches may contribute to healthier populations, lower healthcare burdens related to obesity and non-communicable diseases, and support broader climate mitigation and sustainable development goals. A comprehensive ecological perspective therefore offers a critical foundation for addressing both public health challenges and environmental sustainability within contemporary food environments.

3.4 Sleep quality from an ecological and environmentally sustainable perspective

Table 3 provides an overview of sleep quality among Indonesian adults based on IFLS-5 data. More than half of the respondents (53.7%) reported never experiencing sleep disturbances, and a similar proportion described their overall sleep quality as fair (53.7%). These findings suggest that a large segment of the population perceives their sleep as generally adequate. However, a considerable minority reported some degree of sleep disruption. Approximately 21.8% of respondents indicated experiencing sleep disturbances occasionally, while 9.7% reported poor sleep quality. The alignment between the present findings and earlier studies indicates that suboptimal sleep remains a persistent concern within Indonesia's adult population. Overall, while many adults report adequate sleep, sleep disturbances and poor sleep quality continue to represent significant public health challenges that warrant closer attention.

This findings of sleep-related concerns is consistent with previous research. Alfian et al. (2024) reported that 16.5% of Indonesian adults experience moderate sleep disturbances. Similarly, research by Amelia et al. (2022) found that approximately 10.8% of Indonesians experience poor sleep quality. The consistency between the current findings and previous studies highlights that suboptimal sleep patterns remain a persistent issue within the population. Overall, these results suggest that although many adults report adequate sleep, sleep disturbances and poor sleep quality continue to be significant public health concern that require attention.

Table 3. Overview of sleep quality in Indonesia Based on IFLS-5 data

Variable	N	%
Sleep disturbance		
Never	16,873	53.7
Rarely	3,805	12.1
Sometimes	6,852	21.8
Often	3,100	9.9
Always	802	2.6
Sleep quality		
Very poor	625	2.0
Poor	3,047	9.7
Fair	16,829	53.7
Good	8,568	27.3
Very good	2,363	7.5

Although most respondents reported fair sleep quality, some respondents experienced sleep disturbance or poor sleep quality. This findings is important because sleep has increasingly been recognized as a key behavioral determinan of obesity and other non-communicable diseases. Sleep disturbances and sleep quality are closely intertwined with obesogenic behaviors, as inadequate sleep increases the likelihood of excessice energy intake, reduced physical activity, metabolic dysregulation and subsequent weight gain. Keramat et al. (2023) found that individuals with poor sleep quality have a 1.29 times higher risk of developing obesity than those with good sleep quality, while Xu et al. (2025) reported that those with poor sleep patterns are 1.18 times more likely to experience obesity. These studies highlight the important role of sleep as a behavioral determinant of obesity.

From Bronfenbrenner's ecological perspective, sleep quality is shaped through interactions across multiple environmental systems (Bronfenbrenner, 1979). At the microsystem level, family routines, household conditions, social relationships, and bedtime practices influence sleep duration and quality (Hale et al., 2020). At the exosystem level, work schedules, occupational demands, neighborhood characteristics, and housing environments may indirectly affect sleep opportunities and sleep hygiene (de Souza Dias & de Andrade, 2025; Hale et al., 2020). Meanwhile, macrosystem influences such as urbanization, technological development, socioeconomic inequalities, and cultural expectations regarding productivity contribute to broader sleep patterns within society

(Billings et al., 2020; Hale et al., 2020). These interacting influences demonstrate that sleep quality is not solely an individual responsibility but also reflects broader social and environmental conditions.

Consistent with this ecological framework, the sleep disturbances observed in the present study may be explained by the interaction of multiple behavioral, social, and environmental influences. At the individual level, daily habits such as excessive gadget use and high caffeine intake before bedtime can disrupt the ability to initiate and maintain sleep (Arshad et al., 2021; Philippens et al., 2022; Qanash et al., 2021). At the structural and environmental levels, factors such as night-shift work schedules, limited access to supportive infrastructure for physical activity, and patterns of urbanization associated with poorer dietary intake further contribute to inadequate sleep (Philippens et al., 2022; Shrestha et al., 2025; Wang et al., 2023; Xiao et al., 2024). These interconnected influences highlight the ecological nature of sleep-related behaviors, with individual choices shaped by broader social and environmental determinants.

Given the multiple ecological influences on sleep behavior, addressing sleep-related obesogenic risks requires approaches that extend beyond individual sleep hygiene practices. Similar to active transportation and sustainable diets discussed previously, the creation of sleep-supportive environments represents an important intersection between health promotion and environmental sustainability. Sleep-supportive environments include housing conditions, neighborhood designs, and urban settings that minimize excessive noise, artificial light exposure, overcrowding, and other environmental stressors that may disrupt sleep (Billings et al., 2020). Such environments not only promote healthier sleep patterns but may also contribute to improved well-being, productivity, and quality of life (Billings et al., 2020; Hale et al., 2020).

Environmental conditions play an increasingly important role in shaping sleep quality. Exposure to environmental noise, artificial nighttime lighting, air pollution, and rising ambient temperatures has been associated with poorer sleep quality and shorter sleep duration (Billings et al., 2020; Zhou et al., 2023). Climate change may further exacerbate these challenges, as increasing nighttime temperatures can interfere with thermoregulation during sleep and reduce sleep efficiency (Li et al., 2025; Zhou et al., 2023). Although IFLS-5 did not directly assess environmental exposures such as temperature, noise, or air pollution, these factors may partially explain the sleep disturbances reported by a substantial proportion of respondents. Together, these findings suggest that environmental degradation may directly contribute to sleep disturbances and indirectly reinforce obesogenic behaviors.

Sleep disturbances and poor sleep quality also have broader implications for environmentally friendly behavior. Individuals with inadequate sleep exhibit reduced cognitive control and impaired decision-making, increasing their likelihood of engaging in risky or impulsive behaviors across economic, ethical, and lifestyle domains (Agyapong-Opoku et al., 2025). In addition, insufficient sleep is linked to unhealthy dietary behaviors, including greater consumption of fast food and foods high in sugar and fat (Papatriantafyllou et al., 2022). As previously discussed, these dietary choices, particularly the increased intake of fast food and ultra-processed foods, contribute to higher carbon emissions and environmental burdens (Clark et al., 2020). The relationship between sleep quality and environmental sustainability is therefore bidirectional, whereby environmental degradation may worsen sleep quality through increased heat exposure, noise pollution, and declining environmental conditions, while inadequate sleep may reinforce unhealthy and resource-intensive consumption patterns. Consequently, sleep disturbances may both result from and contribute to environmentally unsustainable conditions.

Overall, these findings demonstrate that sleep quality is deeply embedded within a broader ecological system linking individual health, social environments, and environmental sustainability. Understanding sleep through an ecological and sustainability lens highlights that sleep quality is not solely an individual responsibility but also a product of supportive social, environmental, and policy conditions. Promoting sleep-supportive environments may therefore represent a practical strategy for simultaneously reducing

obesogenic risks and supporting environmental sustainability. Interventions such as reducing environmental noise, improving urban green spaces, enhancing climate-responsive housing, and implementing healthy workplace policies may contribute to better sleep quality while fostering healthier and more sustainable living environments. Such approaches reinforce the dual relevance of sleep quality for both public health promotion and environmental sustainability.

3.5 Nurse role on promoting environmentally friendly behaviour

Nurses play a critical role in linking individual health with broader goal of environmental sustainability through various approaches. Within the context of this study, the prevalence of physical inactivity, consumption of obesogenic foods, and suboptimal sleep patterns emphasizes the importance of nurses in promote health literacy and sustainable lifestyle practices. These behaviours not only affect personal well-being but also contribute to environmental behavior, such as increased food waste, higher carbon emission from processed foods, and energy consumption associated with sedentary lifestyles. Addressing these interconnected challenges requires nurses to adopt a comprehensive approach that integrates health promotion with environmentally responsible practices to further ecological damage. International Council of Nurses (2021) states that the role nurses as caregivers, educators, advocates, case managers, and researchers or innovators, which can be used as comprehensive approach.

Nurses are uniquely positioned to address obesogenic behaviors because their roles extend across multiple ecological levels. Consistent with Bronfenbrenner's ecological framework, nursing interventions can influence individuals and families at the microsystem level, facilitate community-based health promotion within the mesosystem, and contribute to policy development and environmental change at the exosystem and macrosystem levels. This multilevel position allows nurses to bridge individual behavior change with broader environmental and sustainability goals.

As educators, nurses has strategic role to strengthen public understanding of sustainable health behaviors. They can provide structured education on adopting balanced dietary practice, establishing healthy sleep patterns, and engaging in environmentally friendly physical activity such as walking or cycling. In terms of food choices, the '*Isi Piringku*' (Fill My Plate) guidelines and the principles of diverse, nutritionally balanced and safe/*beragam, bergizi seimbang dan aman (B2SA)* can be used to teach communities how to choose nutrient-dense, locally sourced foods that reduce reliance on highly processed products (Badan Pangan Nasional, n.d.; Kementerian Kesehatan Republik Indonesia, 2022). These guidelines address not only dietary intake but also encourage regular physical activity. Educational interventions may be delivered through various modalities, such as community workshop, online learning modules, telehealth counseling, or interactive simulation-based sessions (İlaslan & Şahin Orak, 2025; Peng et al., 2022). Peng et al. (2022) demonstrate that E-Health interventions can effectively encourage increased physical activity and reduce sedentary behavior. Importantly, education on obesogenic behaviors and environmental sustainability should target not only the general public but also nursing students, aiming to raise awareness among future nurses about the significance of integrating health promotion with sustainability (Ebrahim Elshall et al., 2022; Othman et al., 2025).

In addition to educational roles, nurses act as advocates for policies that encourage environmentally friendly behaviors. Although various policies on food processing and distribution exist in Indonesia, their implementation has been suboptimal. Nurses can also participate in policy dialogues and collaborate with multiple sectors, such as government agencies, schools, workplaces, and communities, to expand public spaces that encourage physical activity and to promote campaigns for local food consumption. These potential initiatives include the expansion of safe walking paths, the development of integrated low-emission transportation systems, and the implementation of vehicle-free zones that encourage active mobility (Appolloni et al., 2025; Baobeid et al., 2021; Mouratidis, 2025;

Westenhöfer et al., 2023; Xia et al., 2013). Nurse may also advocate for strengthening food regulations, improving the distribution of local produce, and enhancing food labeling policies to guide healthier public choices.

Beyond their roles as educators and advocates, nurses can contribute as researchers and innovators. Nurse may contribute by generating empirical evidence on the complex interaction between obesogenic behaviors, environmental sustainability, and health outcomes. Research conducted by nurses can support the development of targeted interventions, refine public health strategies, and inform policy-level decisions. Findings from such research can be applied in nursing practice and broader public health initiative (Karim et al., 2024). For example, studies examining the environmental impacts of dietary choices, sedentary lifestyle, or waste generation can provide valuable insights that strengthen health promotion initiatives. The findings can then be integrated into nursing curriculum and continuing professional development programs. In addition, community-based initiatives facilitated by nurses, such as walking groups, healthy cooking programs, community gardens, and environmental awareness activities, may simultaneously promote healthier lifestyles, social engagement, and environmental stewardship. Such initiatives enable nurses to extend health promotion beyond clinical settings and encourage sustainable behavior change at the community level.

Furthermore, nurses may serve as role models by demonstrating healthy and environmentally responsible behaviors in both healthcare settings and communities. The adoption of practices such as reducing food waste, promoting active transportation, and supporting local food consumption may strengthen the credibility of health promotion messages delivered to the public. These actions are consistent with the emerging concept of planetary health, which recognizes the interdependence between human health and environmental sustainability (Glauberman et al., 2023; Potter, 2021; Vandenberg et al., 2025). Through these visible actions, nurses can help translate sustainability principles into practical behaviors that are relevant and achievable within everyday community settings.

Collectively, these strategies highlight the unique position of nurses in addressing obesogenic lifestyles through an ecological and sustainability-oriented approach. By functioning as educators, advocates, researchers, innovators, role models, and community partners, nurses can influence health behaviors across multiple ecological levels. Such multilevel interventions have the potential not only to reduce obesity-related risks but also to encourage environmentally responsible behaviors that support long-term health and sustainability goals. Strengthening nursing capacity in sustainability and planetary health may therefore represent an important step toward achieving healthier populations and more resilient communities in the future.

4. Conclusions

The findings of this study indicate that health behaviors among Indonesians, specifically physical activity, dietary patterns, and sleep quality based on IFLS-5 data, remain suboptimal and collectively contribute to increased obesogenic risk. Most respondents reported low to moderate levels of physical activity, short activity durations, and a preference for high-fat or ultra-processed foods. Although many participants perceived their sleep quality as adequate, a substantial proportion still experienced sleep disturbances. These three behavioral domains do not operate in isolation; instead, they are interconnected and influenced by complex social, economic, and environmental conditions, reflecting the multilevel interactions described in Bronfenbrenner's Ecological Theory.

The findings further demonstrate that obesogenic behaviors and environmental sustainability are closely interconnected. On one hand, obesogenic behaviors contribute to environmental degradation through increased energy use, higher carbon emissions, and the generation of waste associated with food systems and transportation. On the other hand, environmental conditions such as urbanization, climate change, declining environmental quality, and limited access to supportive infrastructure may reinforce obesogenic lifestyles by discouraging physical activity, disrupting healthy sleep, and influencing dietary choices.

This mutual influence highlights the need to position environmental sustainability as an integral element of health promotion and disease prevention strategies, especially within the broader framework of sustainable development.

This study contributes to the growing body of evidence linking human health and environmental sustainability by demonstrating how obesogenic behaviors can be understood within an ecological framework. By integrating Bronfenbrenner's Ecological Theory with the concept of environmental sustainability, this study highlights the importance of viewing obesity prevention not only as a health issue but also as part of a wider sustainability agenda. Such an approach supports the development of interventions that generate co-benefits for both population health and environmental protection.

In achieving these goals, nurses play a central and strategic role as educators, advocates, researchers, innovators, and community partners. Through health education, policy advocacy, community empowerment, and evidence generation, nurses are uniquely positioned to promote environmentally responsible health behaviors across multiple ecological levels. Strengthening nursing capacity in sustainability-oriented health promotion and ecological thinking may therefore enhance the profession's contribution to addressing obesity, improving population health, and supporting the achievement of the Sustainable Development Goals (SDGs). Ultimately, integrating health promotion with environmental sustainability offers a promising pathway toward healthier populations and more resilient and sustainable communities for future generations.

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Author Contribution

The author A.S.R. contributed to the conceptualization, methodology, formal analysis, data curation, writing (original draft preparation), and writing (review and editing). The author has read and agreed to the published version of the manuscript.

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Ethical Review Board Statement

The IFLS data are publicly available (public-use dataset) and have received ethical approval from the organizing institution. This study does not involve direct interaction with human subjects; therefore, no additional ethical approval is required.

Informed Consent Statement

Informed consent was obtained by the original data collectors as part of the IFLS 5 study. This research uses publicly available secondary data and did not involve direct interaction with human participants.

Data Availability Statement

The data used in this study are derived from the Indonesia Family Life Survey Wave 5 (IFLS 5), a publicly available dataset provided by RAND Corporation. The dataset can be accessed at <https://www.rand.org/health/surveys/FLS/IFLS.html>

Conflicts of Interest

The author declare no conflict of interest.

Declaration of Generative AI Use

During the preparation of this work, the author used DeepL and ChatGPT to assist in refining grammar and academic writing style. After using this tool, the author reviewed and

edited the content as needed and took full responsibility for the content of the publication.

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