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Article Research

The Physical and Social Environment Support, and the Role of Information Technology Development on the Implementation of Healthy Lifestyles for Teachers in Bogor City, Indonesia

Dukungan Lingkungan Fisik, Sosial dan Peran Perkembangan Teknologi Informasi Terhadap Penerapan Gaya Hidup Sehat Guru di Kota Bogor, Indonesia

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Abstract: *School health and nutrition research in Indonesia is largely focused on students, with little attention given to how the physical and social environment supports teachers in maintaining a healthy lifestyle. This study explores the impact of physical and social environment support, as well as the role of information technology on the nutritional status of teachers in Bogor City, Indonesia. This research uses a mixed-method approach, conducted in six schools in Bogor City involving a total of 152 teachers. Data collection was carried out using in-depth interviews, focus group discussions (FGD), structured questionnaires, and anthropometric measurements to assess nutritional status. Qualitative data were analyzed using thematic analysis, and the Chi-square test was used to measure bivariate relationships with nutritional status. Based on body mass index (BMI), 61.5% of teachers were overweight or obese, and 76.3% had central obesity. All teachers have at least one social media account and 78.3% follow culinary accounts. Only 15.79% of teachers have access to a canteen or healthy food provider during school hours, and only 25.7% are exposed to obesity prevention programs at school. Bivariate analysis showed a significant correlation ($p<0.05$) between waist circumference and BMI with exposure to culinary content. Thematic analysis found that teachers' busy schedules, social eating culture, and the lack of specific programs to promote healthy eating were major obstacles. Workplace nutrition programs for teachers are urgently needed.*

Key word: Physical Environment, Teacher, Information Technology

1. INTRODUCTION

Education is a key sector in building a healthy and high-quality society. Teachers, as the frontline of the educational process, have a very important role in shaping students' characters and providing positive examples. A teacher's healthy lifestyle not only impacts their personal well-being but can also influence their motivation, productivity, and the quality of teaching they provide (1). The importance of a healthy lifestyle cannot be separated from the physical and social environment at school, which can either support or hinder a teacher's efforts to live healthily.

Along with the times, the development of information technology has become an integral part of daily life. On one hand, technology makes it easier for teachers to complete administrative tasks, but on the other hand, this convenience slowly reduces daily physical activity levels. This decline in physical activity triggers an excess accumulation of energy in the body, ultimately leading to overweight or obesity due to long-term imbalances in energy intake and output.(2).

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Globally, trends show a decrease in physical activity and an increase in sedentary behavior in recent years. According to World Health Organization (WHO) data, 31% of individuals aged 15 and over lack physical activity, triggering overweight issues worldwide. (3). In Indonesia, the prevalence of overweight adults reaches 13.6%, and obesity is at 21.8%. Specifically, West Java Province has the second-highest prevalence of obesity on Java Island at 23%. (4).

Increasing obesity risk factors lead to high rates of Non-Communicable Diseases (NCDs) among the productive age group, including formal sector workers like teachers. People working under pressure or with heavy workloads tend to sit longer, experience stress that triggers emotional eating, and have unhealthy eating patterns. This can result in high prevalence rates of chronic diseases and workplace absenteeism.(3). Unfortunately, research and implementation of occupational health and nutrition programs (Workplace Nutrition/Nutrition Goes to Work) specifically for educators are still very limited in Indonesia. So far, nutrition intervention studies in schools have focused on improving students' nutritional status (5), ignoring the fact that teachers are also a vulnerable group. Therefore, this study aims to examine in depth the supporting and hindering factors of the physical and social environments, as well as the role of information technology, in the implementation of healthy lifestyles among teachers in Bogor City.

2. METHODS

This is a mixed-method study (qualitative and quantitative) designed to comprehensively assess the support of the physical and social environments, and the role of information technology in promoting a healthy lifestyle for teachers. This research was conducted from March to December 2024 across six public primary and secondary schools (Elementary, Middle, and High Schools) in Bogor City.

The study population consisted of teachers and educational staff. Subjects were selected using purposive sampling with inclusion criteria: Indonesian citizens, aged >18 years, registered at the schools being studied, and willing to sign an informed consent form. Exclusion criteria applied to subjects who refused to fully complete the questionnaire or refused anthropometric measurements. A total final sample of 152 respondents was included and analyzed.

Data collection was carried out comprehensively through two approaches:

Quantitative Data: Obtained using a structured questionnaire that assessed demographic characteristics, history of health promotion exposure, risky food consumption patterns (Food Frequency), physical environment support (access to healthy canteens), and the intensity of information technology and social media use.

Nutritional Status Measurements: Conducted through anthropometric methods using standard instruments: Shorr Board for height, measuring tape for waist circumference (central obesity), and a SECA-brand Bioelectrical Impedance Analysis (BIA) scale to accurately measure weight and body fat percentage.
Qualitative Data: Explored in-depth through interviews and Focus Group Discussions (FGD) involving school principals and teacher representatives from each sample school (involving 4–6 teachers from each school, totaling 28 informants). This aimed to

explore the reasons behind eating behaviors, perceptions of nutrition programs, and social barriers not captured by numbers.

All quantitative data were analyzed using statistical software (SPSS). Univariate analysis was presented as percentages and frequency distributions, while bivariate analysis used the Chi-Square test to assess the significance of correlations between independent variables and nutritional status (significance threshold p-value <0.05). Qualitative data analysis was conducted using a thematic analysis approach. This study has been officially reviewed and approved by the Health Research Ethics Committee of Dr. Cipto Mangunkusumo National Central General Hospital, Faculty of Medicine, Universitas Indonesia (Number: KET-481/UN2.F1/ETIK/PPM.00.02/2024).

3. RESULTS

Nutritional Status and Anthropometric Measurements

Based on anthropometric measurements, the majority of the study subjects face overnutrition issues. A total of 65.1% of teachers were classified as overweight and obese based on Body Mass Index (BMI). Body composition measurements showed a more vulnerable condition, where 86.2% of teachers had a body fat percentage above the normal threshold (Overweight), and 76.3% experienced central obesity based on the waist circumference indicator. This result is consistent with the study by (6) which found that the prevalence of obesity among teachers at Perguruan Muhammadiyah Rawamangun was 47.5%. These findings illustrate the high prevalence of overweight and obesity in urban areas. This is attributed to easier access to food in urban settings, which leads to increased consumption levels.

Table 1. Distribution of Teachers' Nutritional Status Based on Anthropometric Indicators

Nutritional Status Indicator	Category	n	%
Body Mass Index (BMI)	Normal	53	34.9
	Overweight / Obese	99	65.1
Body Fat Percentage	Normal	21	13.8
	Overweight	131	86.2
Waist Circumference (Central Obesity)	Normal	36	23.7
	Overweight	116	76.3
Total		**152**	**100**

Physical and Social Environment Support, and Food Consumption Patterns

Regarding physical environment support at school, only a small fraction of teachers (15.79%) stated they had access to a healthy canteen or food stall, while the absolute majority (84.21%) lacked this access in their workplace. This is reflected in the high frequency of risky food consumption. Based on the food frequency instrument, 73.7% of teachers consume flavor enhancers once a day. Sugary drink consumption heavily

dominates, with 32.2% of teachers consuming them daily, and 18.4% consuming them 3-6 times a week. Fatty food consumption is also quite high: 40.1% consume them 3-6 times a week and 18.4% consume them daily. Conversely, a positive finding showed good vegetable consumption, where 60.4% of teachers consume vegetables more than 4 times a day, and 48% of teachers consume fruits with the same frequency. Daily physical mobility is classified as low (sedentary). The main transportation to school is dominated by motorcycles (57.24%) and private cars (17.76%), while walking only accounts for 4.51% of all teachers.

Table 2. Frequency Distribution of Physical Environment Support and Food/Beverage Consumption

Environment & Consumption Variable	Category	n	%
Access to Healthy Canteen/Stall	No	128	84.21
	Yes	24	15.79
Mode of Transport to School	Motorcycle	87	57.24
	Public Transport	31	20.39
	Car	27	17.76
	Walking	7	4.51
Sugary Drink Consumption	1x / Day	49	32.2
	1-2x / Week	49	32.2
	3-6x / Week	28	18.4
	<3x / Month & Never	26	17.1
Fatty Food Consumption	3-6x / Week	61	40.1
	1-2x / Week	49	32.2
	1x / Day	28	18.4
	<3x / Month & Never	14	9.2
Total		**152**	**100**

The Role of Information Technology Development (Social Media)

In terms of digital exposure, 100% of teachers have at least one active social media account. The platforms with the highest ownership proportions are sequentially WhatsApp (25.7%), YouTube (21.7%), and Instagram (19.3%). Regarding access duration, 67.8% of teachers spend 1-3 hours on WhatsApp, 78.9% on YouTube, and 88.6% on Instagram within a 1-3 hour daily range. However, the spotlight is on the type

of content exposure. A total of 78.3% of respondents are frequently exposed to or intentionally follow culinary-related information content, 82.2% are exposed to sports content, and 58.6% to nutrition content.

Table 3. Distribution of Digital Exposure and Social Media Use

Digital Exposure Variable	Category	n	%
Main Social Media Platforms *(*Based on Total Account Ownership)*	WhatsApp	152	25.7
	YouTube	128	21.7
	Instagram	114	19.3
Exposure to Culinary Content	Yes	119	78.3
	No	33	21.7
Exposure to Sports Content	Yes	125	82.2
	No	27	17.8
Exposure to Nutrition Content	Yes	89	58.6
	No	63	41.4
Total		**152**	**100**

Table 4. Bivariate Test Results of Digital and Environmental Exposure Correlation with Nutritional Status

Variable	Nutritional Status Indicator	P-value
Instagram Access Frequency	Body Fat Percentage (%Fat)	0.010*
Twitter Access Frequency	Body Mass Index (BMI)	0.027*
TikTok Access Frequency	Body Fat Percentage (%Fat)	0.033*
Culinary Content Exposure	Body Mass Index (BMI)	0.027*
Culinary Content Exposure	Waist Circumference (Central Obesity)	0.001*
Physical Activity Health Promo	Body Mass Index (BMI)	0.038*
Physical Activity Health Promo	Body Fat Percentage (%Fat)	0.002*
Obesity Health Promo Exposure	Body Mass Index (BMI)	0.029*

**Note: Chi-Square Test, $p < 0.05$.*

The bivariate analysis (*Chi-Square Test*) reveals a significant correlation ($p < 0.05$) between digital/environmental exposure and the nutritional status of teachers in Bogor City. Social Media Usage Frequency; Using Instagram ($p = 0.010$) and TikTok ($p = 0.033$) is significantly correlated with Body Fat Percentage (%Fat). Using Twitter is significantly correlated with Body Mass Index / BMI ($p = 0.027$). Culinary Content Exposure; Exposure to food-related content is significantly correlated with BMI ($p = 0.027$) and Waist Circumference / central obesity ($p = 0.001$). Health Promotion Exposure; Promotions encouraging physical activity show a significant correlation with both BMI ($p = 0.038$) and Body Fat Percentage ($p = 0.002$). Promotions regarding obesity awareness are also significantly correlated with BMI ($p = 0.029$).

Frequent social media use and exposure to digital media—especially culinary content—play a real role in shaping teachers' nutritional status. High exposure to food content can trigger eating behaviors that lead to higher BMI and central obesity. Active health promotions in the teachers' environment (such as campaigns for physical activity and obesity prevention) are positively linked to better body composition indicators (BMI and body fat). A supportive environment with clear health messaging helps build awareness around maintaining a healthy weight. Overall, the results show that adopting a healthy lifestyle depends not only on personal motivation, but also on striking a balance between digital exposure (managing social media and food content) and physical/social support (engaging with health promotions).

Qualitative Exploration Results (Interviews and FGDs)

The thematic analysis from the FGD mapped out hindering and supporting factors for a healthy lifestyle among teachers. Hindering Factors; The main hurdle experienced by teachers is their heavy teaching load and very tight schedules, leading them to frequently skip lunch or replace it with caloric snacks during dinner. Even when bringing packed lunches, teachers are often tempted to buy outside snacks (like chicken noodles, meatballs, and siomay) due to the lack of a healthy canteen. From the social environment aspect, teachers feel sociocultural pressure (the "social function of eating"); they admit it is very difficult to decline food offers when gathering with colleagues. Nutritional literacy is also outdated, with teachers being more fluent in the "4 Healthy 5 Perfect" concept rather than the more modern "My Plate" (Isi Piringku) guidelines.

Supporting Factors; As an adaptation, some teachers use a defense strategy by saying "I'm fasting" to avoid the pressure of snacking on unhealthy foods at school. Teachers with middle-to-upper socioeconomic status reported consuming a variety of fruits. Additionally, a personal medical history or a family history of illness is the strongest external motivator for teachers to start controlling their consumption of Sugar, Salt, and Fat (GGL).

4. DISCUSSION

This study highlights a critical phenomenon in the education sector where the teaching profession, as a pillar of public education, is overshadowed by a Non-Communicable Disease crisis. The high rates of overweight/obesity (65.1%), excess body fat accumulation (86.2%), and central obesity (76.3%) among respondents prove a massive disruption in the energy balance of educational staff. This research discusses several main factors connecting the food environment and built environment in schools

with the use of digital technology.

1. Decline in School Infrastructure Quality and Sedentary Behavior

The absence of infrastructure supporting a healthy lifestyle at work is a primary trigger for obesity in teachers. The fact that 84.21% of teachers lack access to a canteen or healthy food provider within the school environment encourages the formation of an obesogenic environment (7). Based on the Ecological Model of Health Behavior theory (8), the availability of facilities heavily determines individual behavior. The lack of healthy food forces teachers to rely on street food snacks around the school that are high in refined carbohydrates and sodium, such as meatballs, siomay, and chicken noodles, which was qualitatively confirmed by FGD findings. The study by (9) confirms that an obesogenic school environment—characterized by a lack of healthy canteens and physical activity facilities—fosters a widespread sedentary culture. This culture permeates the entire school community, extending beyond students to encompass all members, including teachers who spend long hours at the school.

This is worsened by a daily routine demanding very long sitting durations (sedentary), This triggers the accumulation of abdominal fat (10). Administrative work and grading assignments drastically reduce a teacher's energy expenditure. An analysis of transportation modes shows a high reliance on motorcycles (57.24%) compared to active transport (walking at 4.51%). According to studies (11), high-risk office worker groups trigger visceral fat accumulation in the abdominal area, aligning with the finding of high central obesity rates in this research. Therefore, enhancing nutrition literacy and education for teachers is crucial, particularly as their understanding often remains anchored in the outdated "4 Sehat 5 Sempurna" (4 Healthy 5 Perfect) concept rather than the "Isi Piringku" (My Plate) guidelines. Ideally, awareness regarding obesity prevention should be cultivated continuously starting from pre-service teacher training (12)

2. Dietary Patterns, Social Pressure, and Coping Mechanisms

Food frequency data confirms the high penetration of ultra-processed foods. Daily consumption of flavor enhancers reaches 73.7%, followed by daily sugary drink consumption at 32.2%. High intake of Sugar-Sweetened Beverages (SSBs) is a strong predictor of metabolic syndrome. Ironically, these findings coincide with relatively adequate frequencies of vegetable (60.4% eating >4x a day) and fruit consumption. This paradox can be explained through qualitative results: although frequent, the portion (quantity) consumed often fails to meet the WHO-recommended minimum of 400 grams a day, and the preparation methods are flawed (e.g., making fruit juice with lots of added sweetened condensed milk). The results of this study align with the study by (13), indicating that social media content contributes significantly to the high consumption of sugar, salt, and fat (GGL).

A 2024 study by (14) specifically examines how teachers' lunch and snacking habits influence their nutritional status. This aligns closely with the qualitative findings of the current study, which reveal that heavy workloads often lead teachers to skip lunch or succumb to the temptation of buying unhealthy snacks near the school such as chicken noodles, meatballs, and siomay (steamed fish dumplings) due to the lack of a healthy canteen. This reference reinforces the argument that providing access to nutritious food in the workplace is crucial for preventing obesity among educators.

Sociologically, the culture of "ngariung" (gathering) in the teacher's lounge creates strong social pressure. Teachers consider declining food offers an antisocial act ("hard to refuse eating when gathering"). Nevertheless, a unique coping mechanism emerged where teachers lie by saying "I am fasting" to reduce excess intake or attempt to create a caloric deficit compensation when they return home.

3. "Visual Hunger" Due to Social Media Disruption

One of the most prominent empirical novelties of this research is discovering the destructive role of information technology on teachers' anthropometric profiles. The Chi-Square test definitively proves a strong correlation between exposure to culinary content (mukbang, food vloggers, food recipes) with central obesity ($p=0.001$) and BMI ($p=0.027$). The duration of exposure to visual algorithm-based apps like Instagram ($p=0.010$) and TikTok ($p=0.033$) is significantly related to a high body fat percentage. The results of this study align with research by (15), demonstrating a significant correlation between exposure to food images or videos on social media and patterns of excessive calorie consumption and Body Mass Index (BMI).

In nutritional psychology literature, this phenomenon is termed "Visual Hunger" (16). Continuous exposure to images or videos of foods high in fat and sugar via phone screens stimulates the visual cortex connected to the amygdala, triggering the secretion of the ghrelin hormone (the hunger hormone). This causes teachers to often feel an impulsive urge to consume food through food delivery apps even when they are biologically full (Hedonic Hunger / hunger driven by the brain's reward system, not basal energy needs)(17). Considering 78.3% of teachers are routinely exposed to culinary content, digital literacy interventions regarding diet regulation are absolutely necessary.

4. The Importance of Workplace Health Promotion (Workplace Nutrition)

Research findings suggest that exposure to health education has a significant protective effect. Exposure to health promotion regarding physical activity and obesity is significantly correlated with normal BMI and Body Fat profiles among respondents ($p<0.05$). Unfortunately, up to now, the design of school curriculums and nutrition interventions (such as the My Plate or Balanced Nutrition Tumpeng campaigns) are exclusively targeted at students; meanwhile, as many as 74.3% of teachers stated they had never received specific exposure regarding obesity prevention for themselves. Therefore, specialized health support interventions for teachers within the school environment are crucial as a preventive measure against non-communicable diseases (NCDs) ((18).

Given that family medical history is a main source of motivation for teachers to change, policymakers at the school level and city education office can design secondary prevention program schemes. Teacher occupational nutrition programs, the construction of inclusive healthy canteens (for students and educators), and the provision of simple physical activity facilities (e.g., initiating stretching between teaching breaks) are low-cost preventive measures to ensure the well-being of educational agents in Bogor City.

5. CONCLUSION

Teachers and educational staff in Bogor City are in an overnutrition emergency, characterized by an obesity prevalence (based on BMI) of 61.5%, central obesity of 76.3%, and excess body fat reserves reaching 86.2%. This clinical profile is the accumulation of an unsupportive built environment (84.21% lack access to healthy canteens at school) and a sedentary lifestyle dictated by administrative burdens and passive transportation. Critically, technological developments exacerbate this condition. High social media penetration (Instagram, TikTok) and the intensity of visual exposure to culinary content are statistically proven ($p<0.05$) to stimulate excessive calorie consumption behaviors, correlating directly with increased central obesity indicators and teacher body fat thickness. Although some teachers exhibit adaptive compensatory behaviors (such as using fasting as an excuse to decline social eating and bringing packed lunches), the lack of "My Plate" (Isi Piringku) literacy and the absence of teacher nutrition programs make these efforts suboptimal.

Suggestions

Based on the findings above, proposed policy intervention recommendations include:

1. The Bogor City Education Office and Health Office are advised to develop a prototype "Nutrition Goes to Work" program that not only targets students but also provides routine dietary counseling, lipid profile screening, and BMI monitoring for teachers at school.
2. Schools need to regulate the school canteen ecosystem to obligate the provision of at least one tenant or plant-based, low-sugar menu accessible to teachers for lunch.
3. Enhance digital diet literacy for vulnerable workers to reduce snacking impulsivity caused by the trap of visual hunger from social media.

CONFLICT OF INTEREST

No conflicts of interest in this study.

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