

## Physical fitness and health characteristics among elementary school physical education teachers

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### Abstract

The health status of physical education (PE) teachers is critical because their professional role requires sustained physical demonstration, active supervision, and continuous engagement in movement-based instruction. Empirical evidence regarding the physiological health profile of PE teachers in regional Indonesian contexts remains limited. This study examined the physical fitness and cardiovascular risk profile of elementary school PE teachers in Indramayu Regency, Indonesia, using a descriptive quantitative cross-sectional design. Data were collected from 32 teachers aged 21–45 years through cardiovascular endurance testing (Rockport 1600-meter walk test), blood pressure measurement, resting heart rate (RHR) assessment, and body mass index (BMI) calculation. Data were analyzed using descriptive statistics (mean, percentage, and standard deviation). The results showed that the mean estimated  $\text{VO}_2\text{max}$  was within the moderate category, with 69% of participants classified as good-to-excellent in cardiovascular endurance. However, only 9% were within the normal blood pressure range. In comparison, 19% were pre-hypertensive, 19% were classified as Stage 1 hypertension, and 3% reached a critical category, resulting in 34% falling within elevated blood pressure classifications. Regarding BMI, 53% were within the normal range, 13% were overweight, and 31% were obese, indicating that 41% were overweight or obese. Resting heart rate values were predominantly normal (78%), although 22% exceeded recommended thresholds. These findings demonstrate that adequate aerobic capacity among PE teachers in Indramayu does not uniformly correspond with optimal cardiovascular and metabolic status, highlighting the coexistence of functional endurance and cardiometabolic risk within the same occupational group.

**Keywords:** Physical Fitness, elementary school PE teachers, endurance, hypertension, body mass index (BMI).

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**Authors contribution:** a – Preparing concepts; b – Formulating methods; c – Conducting research; d – Processing results; e – Interpretation and conclusions; f - Editing the final version.

### INTRODUCTION

Physical fitness represents a complex and multidimensional construct encompassing cardiovascular endurance, body composition,

heart rate regulation, and blood pressure status, all of which are closely associated with long-term health outcomes, physiological regulation, and functional work capacity (Clemente-Suárez et al., 2022; Fiorentino et al., 2020). Within the educational profession, adequate physical fitness has been linked to sustained occupational energy, reduced physiological fatigue, improved stress regulation, enhanced productivity, and greater resilience during prolonged instructional activities (Domville et al., 2019; O’Keeffe, 2021; Price & McCallum, 2015). In the specific context of physical education (PE), the significance of physical fitness extends beyond general occupational well-being, as instructional practice relies heavily on repeated physical demonstrations, sustained supervision of student movement, and continuous engagement in dynamic, physically demanding environments. Consequently, the physical condition of PE teachers is not merely an individual health attribute but constitutes a functional component of pedagogical effectiveness and long-term professional sustainability.

The instructional responsibilities of PE teachers necessitate sustained cardiovascular endurance, stable physiological regulation, and sufficient muscular capacity to demonstrate complex motor skills repeatedly while maintaining clarity of instruction and movement precision (Prasetyawati et al., 2020). Teachers with adequate fitness levels are better positioned to sustain instructional pacing, provide consistent modeling of correct technique, circulate actively among students during drills, and maintain high levels of engagement without premature fatigue. Conversely, diminished cardiovascular endurance, elevated resting heart rate, uncontrolled blood pressure, or excessive body mass may reduce the duration and quality of skill demonstrations, limit supervisory mobility, and indirectly lower the intensity and pedagogical impact of physical activity sessions (Arief et al., 2021; Said & Hanafi, 2022). These physiological constraints may influence students’ motor learning opportunities and engagement levels, thereby establishing a direct and measurable link

between teachers' fitness profiles and instructional effectiveness in physical education contexts.

Beyond instructional mechanics, PE teachers occupy a visible social role within school communities as models of active living and healthy behavior. Scholarship in physical activity and educational research emphasizes that teachers' personal health behaviors and embodied practices can shape students' perceptions of physical activity, influence motivational climates, and reinforce health-related norms within schools (Cale et al., 2016; Enright et al., 2020). The expectation that PE teachers personify active lifestyles creates a professional standard in which personal fitness and pedagogical credibility become intertwined. However, emerging empirical evidence indicates that PE teachers are not exempt from health risks such as obesity, hypertension, and declining cardiorespiratory fitness, revealing a professional paradox in which individuals tasked with promoting active living may simultaneously experience adverse health conditions themselves (Ansah et al., 2023; Dempsey et al., 2018). This paradox raises critical questions regarding the alignment between professional role expectations and measurable physiological realities.

Although teacher well-being has been widely discussed in educational research, most empirical investigations have concentrated on psychosocial stress, burnout, or general occupational health among teachers rather than on objective physiological fitness assessments specific to PE teachers (Benevene et al., 2020; Bottiani et al., 2019). Studies that examine teacher health frequently rely on self-reported physical activity levels or perceived well-being measures, which may not accurately capture physiological risk indicators such as blood pressure, resting heart rate, body composition, or cardiovascular endurance capacity (Wang et al., 2025; Živković et al., 2024). Consequently, there remains limited region-specific empirical evidence that objectively evaluates the measurable fitness profiles of PE teachers, particularly within developing

country contexts where occupational health monitoring systems may be less systematically implemented.

This empirical gap is especially evident in Indramayu Regency, where demographic and occupational health patterns among working-age adults suggest increasing exposure to non-communicable disease risk factors, yet no systematic study has directly assessed the objective physical fitness status of elementary school PE teachers in the region. Field observations conducted during preliminary visits to elementary schools revealed contextual patterns that further justify focused investigation. In several schools, PE teachers conducted consecutive instructional sessions with minimal recovery intervals, repeatedly demonstrating movement sequences while supervising large groups of students in outdoor settings under variable environmental conditions (Cox et al., 2023; Csordás-Makszin et al., 2025). Informal discussions with school administrators indicated concerns regarding teacher fatigue and the presence of cardiovascular and metabolic risk factors among staff members, including hypertension and excess body weight. These contextual indicators suggest that occupational physical activity alone may not fully mitigate cardiovascular risk within this professional group, reinforcing the need for objective physiological assessment rather than reliance on assumptions that physically active teachers are automatically protected from cardiometabolic vulnerability.

In this study, physical fitness is operationalized as the capacity to perform occupational tasks efficiently without excessive fatigue while maintaining sufficient physiological reserve for sustained instructional activity and unexpected demands. To translate this conceptual definition into measurable indicators within the Indonesian physical education setting, four standardized physiological measures were selected: cardiovascular endurance, systolic and diastolic blood pressure, resting heart rate, and Body Mass Index (BMI). These indicators collectively capture functional aerobic capacity, autonomic cardiovascular regulation, vascular status, and body composition patterns that are directly relevant to

occupational health in physically demanding educational roles. Their selection reflects both theoretical alignment with multidimensional fitness constructs and a targeted operationalization tailored to the physiological demands faced by Indonesian PE teachers. Based on this conceptual and contextual foundation, the present study adopts a descriptive quantitative cross-sectional design to evaluate the physical fitness profile of 32 elementary school PE teachers selected through purposive sampling from a regional population of 262 teachers in Indramayu Regency. Cardiovascular endurance was assessed using the Rockport 1600-meter walk test, while blood pressure, resting heart rate, and BMI were measured using standardized field procedures under controlled conditions. The objectives of this study are twofold: first, to assess the physical fitness levels of elementary school PE teachers in Indramayu Regency using objective physiological measures; and second, to identify associated health risk factors reflected in their measurable fitness profiles. By generating empirical, region-specific data grounded in standardized physiological assessment, this study contributes novel evidence regarding the fitness status of PE teachers in Indramayu Regency and clarifies how measurable cardiovascular and metabolic indicators intersect with professional expectations of health promotion within regional educational contexts.

## **METHOD**

This study employed a quantitative cross-sectional survey design to evaluate the physical fitness profiles of elementary school physical education (PE) teachers in Indramayu Regency, Indonesia. The cross-sectional approach was selected to provide an objective snapshot of cardiovascular and metabolic indicators within a defined occupational group at a single point in time, allowing for descriptive mapping of health risk patterns without causal inference. From a total population of 262 PE teachers registered in the region, 32 participants were selected through purposive sampling. This sampling strategy was chosen to ensure the inclusion of actively engaged teachers whose professional responsibilities

involved regular physical activity instruction and direct participation in movement-based teaching activities. The inclusion criteria (1) aged 21–45 years, (2) actively teaching for at least three years, and (3) providing informed consent were established to ensure participants represented PE teachers within a productive age range and with sufficient professional experience to reflect stable occupational demands related to physical education instruction.

Data collection was conducted in a single session at the Karanganyar Indramayu Sports Center Stadium under standardized and controlled field conditions to ensure consistency of testing procedures. To enhance measurement reliability, all assessments were administered by trained assessors following uniform testing protocols, standardized instructions, and calibrated equipment procedures. Participants completed a standardized warm-up protocol prior to testing to minimize injury risk and physiological variability during measurement. Resting heart rate and blood pressure were obtained after participants were seated in a rested position to reduce acute variability and ensure stability of physiological readings.

Physical fitness was evaluated using four core indicators: cardiovascular endurance, resting heart rate, blood pressure, and body mass index (BMI). These indicators were selected because they represent key dimensions of cardiovascular capacity, autonomic regulation, metabolic risk, and body composition that are directly relevant to assessing both health risk status and functional work performance in physically demanding professions such as PE teaching. Cardiovascular endurance was assessed using the Rockport 1600-meter walk test, a widely validated submaximal protocol for estimating  $VO_2$ max in adult populations and considered appropriate for occupational and field-based assessment. Resting heart rate and blood pressure were measured using calibrated digital devices with established field accuracy for physiological monitoring. BMI was calculated from measured height and weight following standardized anthropometric procedures, acknowledging its practicality as a screening measure despite its inability to distinguish

between lean mass and adiposity. Detailed measurement protocols and device specifications are provided in Appendix A.

The selection of these indicators was guided by their established association with cardiovascular regulation, metabolic risk, and occupational functional capacity in physically active professions. Cardiovascular endurance reflects aerobic work capacity relevant to sustained instructional demonstration, while resting heart rate and blood pressure provide insight into autonomic and vascular regulation linked to long-term cardiovascular risk. BMI was included as a pragmatic proxy for body composition due to its widespread use in epidemiological surveillance and comparability with national and international health data. Classification cut-offs for cardiovascular endurance, blood pressure, and BMI were applied based on established national and international reference standards, including World Health Organization criteria for BMI categorization and internationally accepted blood pressure guidelines. Each participant's measured value was compared with the corresponding normative threshold to determine categorical status, ensuring consistent and standardized application of cut-off procedures across the dataset.

Data were analyzed using SPSS version 25.0. Descriptive statistical procedures, including mean, percentage, and standard deviation, were used to summarize the distribution of cardiovascular endurance, blood pressure, resting heart rate, and BMI within the sample. Classification outcomes were reported in accordance with the referenced normative standards to maintain methodological transparency and avoid procedural repetition in subsequent sections. Ethical approval for the study was obtained from the Research Ethics Committee of Universitas Negeri Jakarta (No. UNJ/KE/2025/04/20). All participants provided written informed consent prior to participation, and confidentiality was maintained throughout the study in accordance with established ethical research principles.

## RESULT

The distribution of participants across standardized health categories is presented in Table 1. As shown in Table 1, the majority of participants (69%) were classified in the good to excellent category for cardiovascular endurance, indicating that most teachers demonstrate an adequate level of aerobic capacity to sustain physically demanding instructional tasks. However, 25% were categorized as average and 6% as poor to very poor, suggesting that a subset of teachers may experience reduced aerobic work capacity, which could influence their endurance during prolonged teaching sessions or repeated movement demonstrations.

**Table 1.** Summary of Health Indicators

Variable	Category	Number of Participants (n=32)	Percentage (%)
Endurance (Rockport Test)	Good-excellent	22	69%
	Average	8	25%
	Poor-Very Poor	2	6%
Resting Blood Pressure	Normal (< 120/80)	3	9%
	Pre-Hypertension (120-139/80-89)	6	19%
	Hypertension Stage 1 (140-159/90-99)	6	19%
	Hypertensive Crisis (>180/120)	1	3%
	Data Unclassified/Missing*	16	50%
Resting Heart Rate	Normal (60-100 bpm)	25	78%
	Elevated (>100 bpm)	7	22%
Body Mass Index (BMI)	Underweight (<18.5)	1	3%
	Normal (18.5-24.9)	17	53%
	Overweight (25-29.9)	4	13%
	Obese (≥30)	10	31%

\*Data was unclassified due to inconsistent systolic and diastolic values, making accurate categorization based on AHA criteria not feasible. The categories for each health indicator are based on established guidelines for health organizations, such as the American Heart Association (AHA) for blood pressure, the World Health Organization (WHO) for BMI, and established fitness tests for endurance.

In contrast to the relatively favorable endurance distribution, Table 1 reveals greater variability in blood pressure classification. Only 9% of participants were within the normal range, while 19% were classified as pre-hypertensive and another 19% as Stage 1 hypertension. One participant (3%) fell into a critical category, indicating a substantially elevated cardiovascular risk level. Notably, 50% of the data were unclassified due to inconsistent systolic and diastolic readings, highlighting instability in blood pressure regulation and underscoring the complexity of interpreting cardiovascular status within this sample. This variation

suggests that acceptable aerobic endurance does not uniformly correspond with optimal vascular health.

Resting heart rate findings, as displayed in Table 1, indicate that 78% of participants were within the normal physiological range, reflecting generally stable autonomic regulation at rest. However, 22% exceeded the normal threshold, which may signal heightened physiological strain or reduced recovery efficiency. Regarding body mass index (BMI), 53% of participants were classified within the normal range, while 13% were overweight and 31% were obese. The presence of overweight and obesity among a considerable proportion of teachers suggests potential metabolic vulnerability that may not be immediately apparent through endurance performance alone.

Taken together, the categorical distributions presented in Table 1 demonstrate a multidimensional health pattern among physical education teachers in Indramayu Regency, where functional aerobic capacity coexists with measurable cardiovascular and metabolic risk indicators. This category-based analysis provides a clearer understanding of how different physiological domains contribute to the overall health profile of the teaching population studied.

## **DISCUSSION**

The findings of this study reveal a multidimensional and complex health profile among elementary school physical education teachers in Indramayu Regency, characterized by relatively favorable cardiovascular endurance coexisting with elevated blood pressure and excess body weight in a proportion of participants. The majority of teachers demonstrated good to excellent aerobic endurance as measured by the Rockport test, suggesting that routine engagement in movement-based instructional activities contributes to maintaining functional cardiorespiratory capacity. Similar mixed patterns have been documented in occupational populations in which functional aerobic fitness does not necessarily correspond to optimal cardiovascular risk profiles (Dempsey et al., 2018; Lobelo et al., 2020). While endurance performance reflects

submaximal aerobic capacity and the ability to sustain instructional activity, it does not fully capture broader vascular and metabolic processes involved in long-term cardiovascular regulation (Haapala et al., 2017). The coexistence of adequate endurance with pre-hypertensive and hypertensive classifications, therefore, underscores the importance of interpreting teacher health through integrated physiological indicators rather than equating aerobic performance with comprehensive cardiovascular protection.

A clearer pattern emerges when endurance findings are examined alongside blood pressure classifications. Although aerobic capacity appeared sufficient for most participants, a considerable proportion fell within elevated blood pressure categories, indicating underlying vascular strain that is not directly detected through endurance assessment. Similar paradoxical patterns have been reported in occupational health research, where physically active individuals still exhibit elevated cardiovascular risk when exposed to chronic stress, insufficient recovery, or unfavorable lifestyle conditions (Chaturvedi et al., 2024; Dempsey et al., 2018; Gu et al., 2016). In the context of Indramayu Regency, several contextual factors may contribute to this discrepancy. Physical education teachers often conduct consecutive teaching sessions with minimal recovery intervals, repeatedly demonstrate movement sequences, supervise large student groups in outdoor environments, and assume additional administrative responsibilities beyond instructional duties. Sustained occupational workload and psychosocial demands may contribute to sympathetic nervous system activation and vascular strain independent of aerobic fitness levels (Benevene et al., 2020). Dietary patterns characterized by high sodium intake, limited structured health screening, and inconsistent preventive medical monitoring may further amplify cardiovascular vulnerability. Compared with developed educational systems where institutional health surveillance and structured wellness programs are more systematically integrated into teacher support mechanisms, access to preventive healthcare and occupational monitoring in regional

Indonesian settings remains comparatively limited. These structural differences may partially explain why acceptable aerobic endurance coexists with elevated blood pressure within this professional group.

The relationship between body mass index and blood pressure further reinforces the need for multidimensional interpretation. Although BMI is widely used as a practical epidemiological screening tool (Cahyaningrum et al., 2025), it does not distinguish between lean mass and adiposity, which is particularly relevant in physically active populations. Higher BMI values among PE teachers may partially reflect increased muscle mass due to sustained movement demonstration; however, the presence of overweight and obese classifications also indicates potential metabolic strain. Excess body weight has been consistently associated with increased cardiovascular morbidity and long-term health complications (Chaturvedi et al., 2024; Lobelo et al., 2020). When considered together, elevated BMI and hypertensive classification suggest cumulative cardiometabolic risk that may not immediately impair endurance test performance but may influence long-term occupational sustainability. Indicators such as body fat percentage or waist-to-hip ratio may provide a more precise evaluation of metabolic health in physically active professionals, particularly when assessing cardiovascular risk patterns (Tito et al., 2019; Vala et al., 2022).

From a professional perspective, these physiological findings carry significant implications for instructional effectiveness and career longevity. Physical education teachers are widely recognized as promoters of active living and visible exemplars of healthy behavior within school communities (Cale et al., 2016; Enright et al., 2020). Their professional role depends on repeated movement demonstration, sustained supervision, and consistent instructional energy. Higher fitness levels have been associated with reduced perceived stress, improved energy regulation, and lower burnout risk (Lobelo et al., 2020). However, persistent hypertension and metabolic imbalance may gradually reduce stamina, recovery capacity, and resilience under occupational demands, thereby affecting instructional

sustainability. The findings therefore reinforce the distinction between occupational physical activity and structured health-oriented exercise and highlight that maintaining teacher health is not solely an individual responsibility but a structural component of educational quality.

Several methodological limitations should be acknowledged when interpreting these results. Blood pressure measurements were obtained during a single session, which may increase the risk of temporary misclassification due to situational stress responses or short-term physiological fluctuations (Chaturvedi et al., 2024). Although standardized protocols were applied, single-occasion assessment cannot fully represent long-term blood pressure patterns. The cross-sectional design restricts causal inference and captures physiological status at a single time point. In addition, BMI does not directly assess body fat distribution, and unmeasured variables such as dietary intake, sleep quality, leisure-time physical activity, and psychosocial stress were not evaluated. Future research should incorporate repeated cardiovascular measurements, longitudinal designs, more precise body composition assessments, and systematic evaluation of occupational and lifestyle factors to clarify the mechanisms underlying the observed coexistence of adequate endurance and cardiovascular risk among physical education teachers in Indramayu Regency.

## CONCLUSION

This study demonstrates that elementary school physical education teachers in Indramayu Regency present a multidimensional health profile characterized by the coexistence of adequate aerobic endurance and measurable cardiovascular and metabolic risk indicators, including elevated blood pressure and excess body weight. The findings challenge the assumption that occupational physical activity alone ensures comprehensive cardiovascular protection, showing that functional endurance associated with teaching duties may be sustained while underlying vascular and metabolic vulnerabilities remain present. By integrating indicators of endurance, blood pressure, and BMI, this study

refines the understanding of teacher fitness beyond singular performance metrics. It provides region-specific, objectively measured evidence in a context where such data have been limited. In practice, the results indicate that routine instructional activity should not be treated as a sufficient marker of teacher health, and they support the need for periodic cardiovascular monitoring and preventive strategies aligned with the occupational demands of physical education. Although the study is limited by the use of BMI as a proxy for body composition, single-session blood pressure measurement, and the constraints of cross-sectional design, future research employing longitudinal approaches, more precise adiposity measures, and integration of occupational and psychosocial variables is needed to clarify the mechanisms underlying the observed cardiometabolic patterns. Ultimately, sustaining the physiological integrity of physical education teachers constitutes a foundational condition for maintaining instructional effectiveness, professional longevity, and the long-term quality of physical education programs.

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