RESEARCH ARTICLE

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The Current Situation of Secondary Students' Physical Fitness in Hanoi Suburbs

Phung Xuan Dung and Nguyen Quang Vinh

ABSTRACT

The article is written to provide accurate and thorough information regarding the present level of physical fitness among secondary students in Hanoi suburbs. The researcher has employed conventional scientific research methods in the field of physical education to determine 12 criteria to assess the physical fitness of secondary school students in the suburbs of Hanoi through 03 factors: morphological traits (4 criteria), physical strength (7 criteria), and physical functions (1 criterion). In terms of morphological indicators, stamina, and agility, the results show that the students in Hanoi suburbs appear healthier than other Vietnamese students of the same age and sex in 2001; they are superior in speed and agility at some ages, and nearly equivalent in endurance and physical functions. This provides the foundation for suggesting strategies to increase the efficacy of physical education in today's schools.

Keywords: Current situation, Hanoi, Physical fitness, Secondary students, Suburbs.

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I. Introduction

Physical development is the process of morphological features, physical functions, and physical potentials according to rules throughout a person's life, all of which have a direct impact on a person's capacity to operate physically and intellectually. Changes in senses, muscular growth and movement abilities are all part of physical development. It is influenced by a variety of variables, including congenital, genetic, environmental, and parenting. The living conditions in affluent countries are reasonably steady, and physical examinations are suggested every 5–10 years. It should be undertaken more frequently in Vietnam, in my perspective, because the physical development of young people has changed dramatically after the two-decade unification and tremendous socio-economic development.

Students are regarded as the country's future core workforce. Another way to say, they play a crucial role in the country's rebirth, industrialization, and modernization. As a result, the physical development of future generations is not only a concern for the human species but also for the future national workforce. Therefore, gathering accurate and comprehensive data on their physical development is the first and foremost phase, as it lays the groundwork for developing solutions to the better performance of Physical Education work as well as children's physical development. Recognizing its significance, the author chose to do research on: "The Current Situation Of Secondary Students' Physical Fitness In Hanoi Suburbs".

The study's goal is to give reliable, comprehensive, and scientific information regarding secondary students' physical fitness in Hanoi's suburbs. This is a crucial foundation for recommending physical development programs in schools.

II. Methodology

A. Theoretical Research

To assure the scientific of the criteria by referencing a wide range of related documents.

B. Interview

To sort out the suitable criteria for assessing the physical fitness of students in suburban areas of Hanoi by interviewing experts.

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C. Pedagogical Test Method

To measure the students' physical conditions related to Forward bend test (cm), Hand-Grip Strength (kG), Sit-up test (times/30 s), Long jump (cm), Run 30 m XPC (s), Shuttle Run 4×10 m(s), Race run in 5 minutes (m).

D. Medical Examination Method

To check morphological indexes (Height (cm), Weight (kg), Quetelet Index (g/cm), Body Mass Index BMI (kg/m^2), and Cardiovascular assessment (HW).

E. Mathematical Statistics

To analyze the data collected during the research by employing two software: SPSS 20.0, Microsoft Excel.

F. Subjects of Physical Examination

2540 secondary school students in the suburbs of Hanoi (1392 boys and 1148 girls), specifically:
Grade 6 (11 years old): 635 students (351 boys and 284 girls);
Grade 7 (12 years old): 635 students (355 boys and 280 girls);
Grade 8 (13 years old): 636 students (348 boys and 288 girls);
Grade 9 (14 years old): 634 students (338 boys and 296 girls);
When to test: September 2021.
Subjects of interviews: 90 managers, administrative staff, educators and physical education teachers who have been in charge of or working at secondary school in suburban areas of Hanoi.

III. Results And Discussions

A. Physical Current Status of Secondary School Students in Hanoi Suburbs Selection of Physical Indicators of Secondary Students

To assess the physical condition of the research subjects, the study conducted a survey and pedagogical examination on 2540 students in grades 6, 7, 8, and 9 from secondary schools in Hanoi's suburbs, using the Institute of Sports Science's physical assessment test of Vietnamese people in 2001 (Institute of Sports Science, 2003) and assessment tests according to physical training regulated and promulgated by the Ministry of Education and Training (Decision No.53/2008/QD-BGDĐT dated September 18, 2008). The test contents include 12 indicators: Height (cm), Weight (kg), Quetelet Index (g/cm), BMI (kg/m^2), Cardiac function index (HW) , Forward bend test (cm), Hand-Grip Strength (kg), Sit-up test (times/30 s), Long jump (cm), Run 30 m XPC (s), Shuttle Run 4×10 m (s), Race run in 5 minutes (m).

On that foundation, the author gathered adequate data to compare physical conditions among secondary pupils of the same age in two different time periods: 2020–2021 and 2001 (data provided by the Institute of Sports Science). The results are presented in Tables I to IV.

TABLE I: Comparison in Physical Fitness between 11 Year-old Students (6th Grade) of Hanoi Suburban Secondary Schools in 2020 –2021 (n = 635) and Vietnamese Fitness in 2001

No.	Criteria (Test)	Schoolboys (n = 351)					Schoolgirls (n = 284)				
		$x \pm \delta$	Cv	Vietnamese Fitness in 2001	t	P	$x \pm \delta$	Cv	Vietnamese Fitness in 2001	t	P
1.	Height (cm)	141.68±21.21	14.97	137.59±7.39	3.56	<0.001	142.68±20.20	14.15	139.44±7.32	2.67	<0.001
2.	Weight (kg)	34.00±5.30	15.59	30.03±3.63	13.27	<0.001	34.39±5.37	15.61	30.41±5.83	12.10	<0.001
3.	Quetelet Index (g/cm)	243.50±32.60	13.39	217.74±38.49	12.74	<0.001	245.62±33.01	13.44	217.76±33.55	12.93	<0.001
4.	BMI (kg/m^2)	17.12±2.13	12.44	15.73±2.28	10.78	<0.001	17.05±2.11	12.38	15.53±1.98	11.18	<0.05
5.	Cardiac function index (HW)	12.75±1.27	9.96	12.86±3.55	-0.94	>0.05	12.90±1.19	9.22	13.82±4.08	7.08	<0.001
6.	Forward bend test (cm)	6.85±1.25	18.24	6.00±5.59	5.19	<0.001	6.81±1.26	18.50	6.00±6.04	4.55	<0.001
7.	Hand-Grip Strength (kG)	20.18±3.04	15.06	19.37±3.80	4.23	<0.001	19.59±3.07	15.67	17.78±3.61	8.78	<0.001
8.	Sit-up test (times/30 s)	16.78±1.81	10.73	16.00±4.68	4.94	<0.001	13.62±1.83	13.44	11.00±4.71	15.76	<0.001
9.	Long jump (cm)	168.30±20.99	12.47	161.00±17.88	5.99	<0.001	158.24±21.25	13.42	150.00±16.10	6.18	<0.001
10.	Run 30 m XPC(s)	5.50±0.93	16.91	5.69±0.48	-3.71	<0.001	6.10±0.89	14.59	6.18±0.59	-1.45	>0.05
11.	Shuttle Run 4×10 m(s)	11.42±1.24	10.86	11.61±0.86	-2.71	<0.001	12.26±1.26	10.28	12.44±0.96	2.28	<0.001
12.	Race run in 5 minutes (m)	882.88±95.99	10.87	880.00±117.25	0.48	>0.05	782.36±98.14	13.47	788.00±106.17	-0.87	>0.05

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TABLE II: COMPARISON IN PHYSICAL FITNESS BETWEEN 12 YEAR-OLD STUDENTS (7TH GRADE) OF HANOI SUBURBAN SECONDARY SCHOOLS IN 2020–2021 (N = 635) AND VIETNAMESE FITNESS IN 2001

No.	Criteria	Schoolboys (n = 355)					Schoolgirls (n = 280)				
		x ±δ	Cv	Vietnamese Fitness in 2001	t	P	*x* ±δ	Cv	Vietnamese Fitness in 2001	t	P
1.	Height (cm)	148.06±9.25	6.24	143.27±8.34	8.88	<0.001	148.68±7.22	4.85	144.69±7.19	8.45	<0.001
2.	Weight (kg)	39.22±5.25	13.38	33.24±7.38	17.52	<0.001	39.13±5.37	13.72	33.84±6.21	14.64	<0.001
3.	Quetelet Index (g/cm)	265.28±30.68	8.61	231±40.12	17.58	<0.001	261.12±33.25	12.73	233±35.22	12.79	<0.001
4.	BMI (kg/m^2)	17.98±2.28	12.68	16.04±2.27	14.33	<0.001	17.75±2.15	12.11	16.06±2.04	12.11	<0.001
5.	Cardiac function index (HW)	12.98±2.12	16.33	13.25±4.07	-1.73	>0.05	13.50±3.96	29.33	14.40±3.98	-3.47	<0.001
6.	Forward bend test (cm)	8.02±1.85	23.07	6.00±5.80	11.01	<0.001	7.78±2.33	29.94	7.00±6.13	3.80	<0.001
7.	Hand-Grip Strength (kG)	23.12±3.88	16.78	22.30±4.96	3.32	<0.001	22.03±3.95	17.93	21.25±3.90	3.02	<0.001
8.	Sit-up test (times/30 s)	17.78±3.62	20.35	17.00±4.47	3.45	<0.001	12.78±3.48	27.23	12.00±4.40	3.26	<0.001
9.	Long jump (cm)	177.36±17.95	10.12	172.00±18.00	5.02	<0.001	159.22±18.21	11.43	153.00±17.11	5.27	<0.001
10.	Run 30 m XPC(s)	5.45±0.96	17.61	5.53±0.48	-1.52	>0.05	6.01±0.36	5.99	6.09±0.56	-3.03	<0.001
11.	Shuttle Run 4×10 m(s)	11.30±1.24	10.97	11.39±0.89	-1.29	>0.05	12.32±1.24	10.06	12.43±0.91	-1.41	>0.05
12.	Race run in 5 minutes (m)	901.36±95.99	10.65	905.00±118.91	-0.61	>0.05	786.66±88.26	11.21	787.00±107.39	-0.06	>0.05

TABLE III: COMPARISON IN PHYSICAL FITNESS BETWEEN 13 YEAR-OLD STUDENTS (8TH GRADE) OF HANOI SUBURBAN SECONDARY SCHOOLS IN 2020–2021 (N = 635) AND VIETNAMESE FITNESS IN 2001

No.	Criteria	Schoolboys (n = 348)					Schoolgirls (n = 288)				
		x ±δ	Cv	Vietnamese Fitness in 2001	t	P	*x* ±δ	Cv	Vietnamese Fitness in 2001	t	P
1.	Height (cm)	153.64±8.66	5.64	149.77±8.30	7.52	<0.001	152.67±6.36	4.17	148.82±6.33	9.36	<0.001
2.	Weight (kg)	42.89±7.22	16.83	37.80±7.52	11.67	<0.001	42.49±6.22	14.64	37.54±6.17	12.32	<0.001
3.	Quetelet Index (g/cm)	277.21±42.06	15.17	251±41.11	10.45	<0.001	275.69±36.21	13.13	252.00±35.80	10.13	<0.001
4.	BMI (kg/m^2)	18.06±2.28	12.62	16.72±2.26	9.90	<0.001	17.64±2.35	13.32	16.90±2.22	4.91	<0.001
5.	Cardiac function index (HW)	12.36±3.68	29.77	12.73±3.66	-1.68	>0.05	14.86±3.26	21.94	14.63±4.11	1.04	>0.05
6.	Forward bend test (cm)	8.91±3.22	36.13	7.00±6.40	7.86	<0.001	8.89±3.36	37.80	8.00±6.56	3.37	<0.001
7.	Hand-Grip Strength (kG)	27.91±5.68	20.35	26.87±6.44	2.97	<0.001	24.56±3.85	15.68	23.49±4.60	4.15	<0.001
8.	Sit-up test (times/30 s)	18.83±3.22	17.10	18.00±3.96	4.10	<0.001	12.82±4.26	33.23	12.00±4.30	2.97	<0.001
9.	Long jump (cm)	192.22±20.78	10.81	183.00±20.86	7.40	<0.001	160.02±16.24	10.15	157.00±16.91	2.85	<0.001
10.	Run 30 m XPC(s)	5.15±0.91	17.67	5.29±0.49	-2.77	<0.001	5.87±0.56	9.54	6.02±0.58	-4.11	<0.001
11.	Shuttle Run 4×10 m(s)	11.05±1.21	10.95	11.08±0.83	-0.44	>0.05	12.37±0.92	7.44	12.38±0.88	-0.17	>0.05
12.	Race run in 5 minutes (m)	936.69±95.25	10.17	931.00±122.34	0.94	>0.05	778.62±102.36	13.15	771.00±101.24	1.15	>0.05

TABLE IV: COMPARISON IN PHYSICAL FITNESS BETWEEN 14 YEAR-OLD STUDENTS (9TH GRADE) OF HANOI SUBURBAN SECONDARY SCHOOLS IN 2020–2021 (N = 635) AND VIETNAMESE FITNESS IN 2001

No.	Criteria	Schoolboys (n = 338)					Schoolgirls (n = 296)				
		x ±δ	Cv	Vietnamese Fitness in 2001	t	P	*x* ±δ	Cv	Vietnamese Fitness in 2001	t	P
1.	Height (cm)	159.64±6.85	4.29	155.36±7.97	9.97	<0.001	155.88±5.26	3.37	151.28±5.54	13.54	<0.001
2.	Weight (kg)	46.56±8.02	17.23	41.87±7.69	9.73	<0.001	44.26±5.76	13.01	40.45±5.71	10.36	<0.001
3.	Quetelet Index (g/cm)	294.25±32.88	11.17	268.00±39.50	12.64	<0.001	285.12±33.01	11.58	236.00±33.00	24.84	<0.001
4.	BMI (kg/m^2)	18.00±2.22	12.33	17.16±2.08	6.32	<0.001	18.34±2.25	12.27	17.65±2.08	4.86	<0.001
5.	Cardiac function index (HW)	12.31±3.65	29.65	12.65±3.86	-1.52	>0.05	14.82±4.65	31.38	14.76±4.15	0.21	>0.05
6.	Forward bend test (cm)	9.89±4.58	46.31	8.00±7.14	6.02	<0.001	9.76±4.68	47.95	8.00±6.92	5.35	<0.001
7.	Hand-Grip Strength (kG)	32.96±6.85	20.78	31.52±6.72	3.48	<0.001	26.58±4.12	15.50	25.79±4.52	2.95	<0.001
8.	Sit-up test (times/30 s)	19.58±4.66	23.80	19.00±4.19	2.09	<0.05	13.78±4.65	33.74	12.00±4.36	6.05	<0.001
9.	Long jump (cm)	199.36±21.95	11.01	193.00±21.02	4.82	<0.001	162.98±16.25	9.97	159.00±15.93	3.84	<0.001
10.	Run 30 m XPC(s)	5.09±0.98	19.25	5.17±0.53	-1.45	>0.05	5.96±0.58	9.73	6.09±0.61	-3.47	<0.001
11.	Shuttle Run 4×10 m(s)	10.86±0.87	8.01	10.85±0.84	0.19	>0.05	12.07±0.89	7.37	12.42±0.94	6.09	<0.001
12.	Race run in 5 minutes (m)	996.35±95.99	9.63	997.00±114.46	-0.11	>0.05	778.26±86.32	11.09	781.00±105.98	-0.48	>0.05

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IV. About Morphological Traits

Secondary school students' heights are in line with their developmental stages. It also reveals that the rate of height development between the ages of 11 and 14 years old is dramatically different; the following year is much greater than the previous year, despite being examined using the "horizontal follow-up" approach. Girls grow 4.06 cm in height between the ages of 11 and 12, 12-13, and 13-14, whereas boys grow 5.98 cm.

In terms of weight, there are comparable patterns; between the ages of 11 and 14, weight gain is inherited; the average weight gain in the age groups (11–12; 12-13; and 13–14 years old) of schoolboys is 4.85 kg, and that of schoolgirls is 3.62 kg.

Their increasing weight shows the students' consistency with their height growth, as determined by the Quetelet and BMI (Body Mass Index) indices, which validate the body mass ratio of height to weight. The BMI figures suggest male students (17.12–18.06 kg/m^2) and female students (17.05–18.34 kg/m^2). Their weight is acceptable, according to the evaluation table of nutritional status of children aged 5 to 19 years old based on Z-score (WHO, 2007). Moreover, the Quetelet Index shows how much one high cm weighs. In general, people of the same age and gender with a higher score tend to have better-developed motor organs. "The average Quetelet index is roughly 370–400 g/cm for men, 325–375g/cm for women," (Nguyen The Truyen *et al*, 2002) stated. "Athletes may have weak physical strength if it is tiny. If it is too huge, athletes will struggle to move and will get tired soon." Therefore, when the Quetelet index is applied to male students (243.50–294.25 g/cm) and female students (245.62–285.12 g/cm), it suggests that Hanoi suburban secondary students are not physically well-developed in comparison to thin people's height.

When comparing the figures in morphological indexes between secondary school students in the suburbs of Hanoi and Vietnamese people of the same age in 2001 (published by the Institute of Sports Science, with $t_{calculated} > t_{table}$ the probability threshold $P < 0.001$), it is found that the morphological indexes (height, weight, BMI, Quetelet index) all have significant differences. It illustrates that the development of morphological traits in secondary school pupils in Hanoi suburbs now is superior to those of Vietnamese of the same age and sex in 2001.

Fig. 1 depicts the physical development of Hanoi suburban secondary students from 11 to 14 years old.

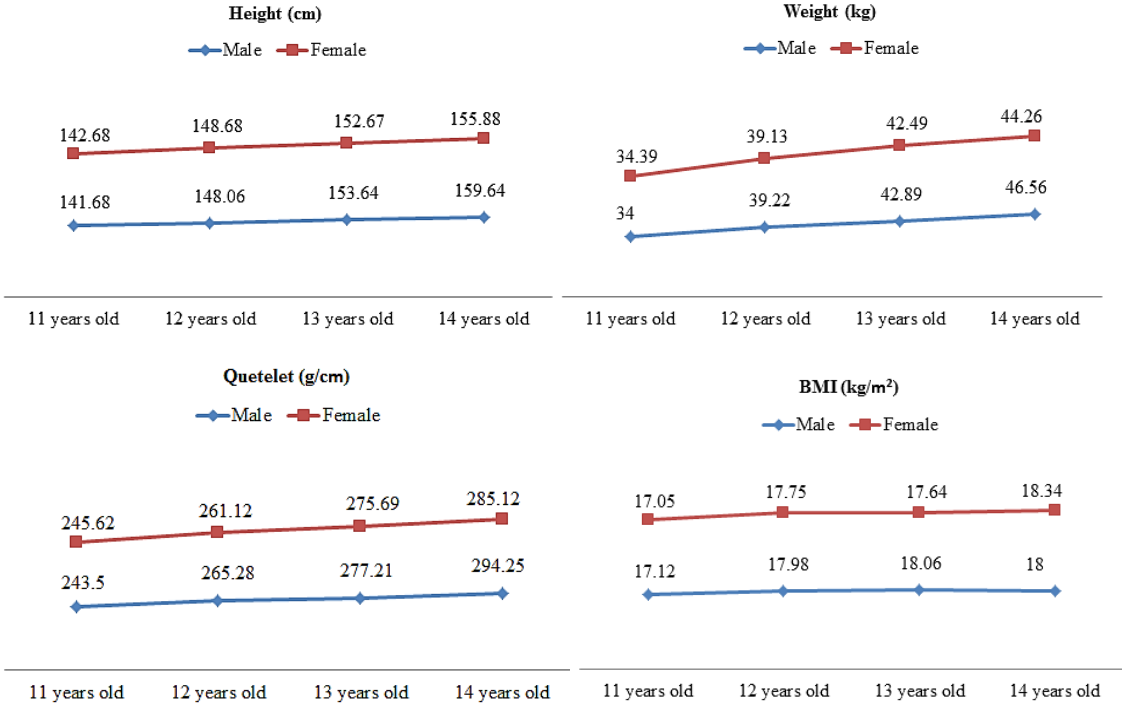

Fig. 1. Development of morphological traits of secondary school students in Hanoi suburbs.

V. About Physical Functions

In terms of cardiac function index, there is no age-related growth in both boys and girls, while there is a difference between secondary school students in Hanoi suburbs and Vietnamese people at the same age in 2001 ($t_{calculated} > t_{table}$ with $P < 0.05$). However, students in grades 6, 7, 8, and 9 generally do poorly on this indicator (ranging from 11 to 15 HW according to Rufier's categorization). The cardiac function index measures the heart's capacity to perform under normal conditions of exercise. Nonetheless, some recently published studies have stated that while modern middle school pupils have a well-developed physical

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structure, their physiological mobility is still relatively limited. As a result, it is thought to have a direct impact on student physical activity.

When comparing cardiac function indexes between secondary school students in Hanoi suburbs and Vietnamese people in 2001 (published by the Institute of Sports Science, with $t_{calculated} < t_{table}$ at the threshold of probability $P > 0.05$), it is discovered that they have a slight difference. Most cardiac function indexes of the secondary school pupils in Hanoi's outskirts, in particular, are comparable to that of Vietnamese persons of the same age and gender in 2001. However, at the ages of 11 and 12, the secondary school pupils in Hanoi's suburbs nowadays have a better heart function index than that in 2001 ($t_{calculated} > t_{table}$ at the threshold of probability $P < 0.001$).

VI. Comparison Results Through Figure II

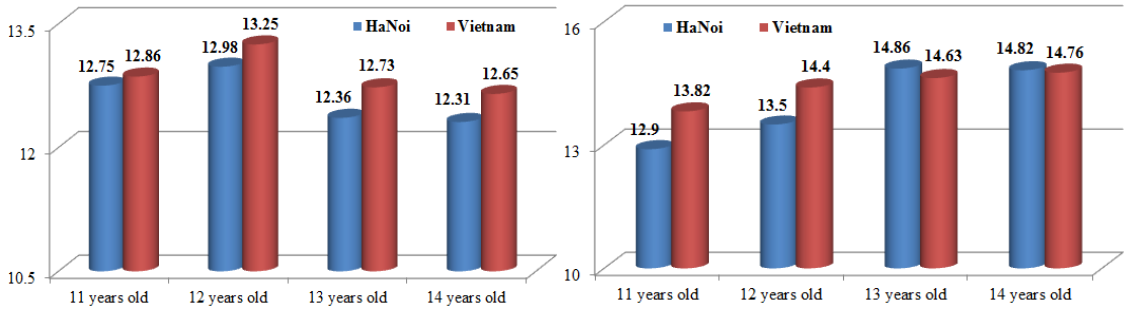

Fig. 2. Comparison of cardiac function between Hanoi suburban secondary students and Vietnamese students in 2001.

VII. About Physical Strength

Despite an increase in the age group 11-14, the test results in many physical tests remain relatively consistent. However, the results obtained from Hanoi suburban secondary pupils outperform the results of the 2001 population data of the same age and gender ($t_{calcualted} > t_{table}$ with $P<0.05$ to $P < 0.001$). This difference is obvious among male pupils and gradually lessened among female students (ages 11, 12, 13, and 14), specifically:

Grade 6 (11 years old): Compared with the physical abilities of Vietnamese people of the same age and sex in 2001, the students in Hanoi suburban secondary schools tend to perform better in terms of arm strength, leg strength, back abdominal muscles, flexibility, dexterity and speed (male), while performing comparably in terms of strength and speed (female).

Grade 7 (12 years old): Compared with the physical abilities of Vietnamese people of the same age and sex in 2001, the students in Hanoi suburban secondary schools tend to perform better in terms of arm strength, leg strength, back abdominal muscles, flexibility, and speed (female), while performing comparably in terms of strength, dexterity and speed (male).

Grade 8 (13 years old): Compared with the physical abilities of Vietnamese people of the same age and sex in 2001, the students in Hanoi suburban secondary schools tend to perform better in terms of arm strength, leg strength, back abdominal muscles, flexibility and strength, while performing comparably in terms of endurance and dexterity.

Grade 9 (14 years old): Compared with the physical abilities of Vietnamese people of the same age and sex in 2001, the students in Hanoi suburban secondary schools tend to perform better in terms of arm strength, leg strength, back abdominal muscles, flexibility, dexterity (female) and speed (female), while performing comparably in terms of endurance, ingenuity (male) and speed (male).

Generally, the physical strength of secondary school students in Hanoi's suburbs is suggested superior to that of Vietnamese people of the same age and gender in 2001 in terms of strength and flexibility; better to speed and dexterity at some ages, and comparable in endurance, according to the results of the above analysis. The data also show that, after 20 years, the physical strength of secondary school students in Hanoi's outskirts has improved, but not completely, since endurance strength appears to be missing. It might be due to the attributes of today's lower secondary school pupils, who spend most of their time focusing on cultural learning (orienting the university entrance exam) but have little time to practice sports. Furthermore, current physical education teaching in schools has not satisfied the needs of addressing the task of raising awareness and developing physical fitness in students. Besides, a large number of students might not have been trained properly in accordance with physical assessment standards. Many students, despite their interest in sports and physical training, are unable to arrange their time to participate in extracurricular exercises, nor do they have a suitable instructor. Parallel to the fact that the environment for ensuring the physical training activities of the schools has not fulfilled the training requirements of students, many schools continue to lack the policy regime and organization to guide students. Also, there appears not enough incentive or motivation for youngsters to participate in extracurricular sports and physical training.

According to WHO research published in The Lancet Child & Adolescent Health, the above results are explainable because of the rise of digital technology, which has resulted in students being extremely sluggish to exercise. Currently, 80% of children worldwide (85% girls and 78% boys) lack physical exercise, which can be damaging to their health (World Health Organization, 2004). According to WHO, between 60% and 85% of the world's population does not engage in adequate fitness activities. As a result, it is regarded as the fourth leading risk factor for world mortality. As claimed by Leanne Riley, who is a co-author of that study report, while physical activity levels have not increased, numbers of overweight and obese children continue to "gallop" (World Health Organization, 2010). Adolescents should engage in at least one hour of physical exercise every day, according to WHO standards (World Health Organization, 2010). Following UNFPA, Vietnam is one of the ten nations with the most inactive population in the world, with up to 30% of adults lacking physical exercise; the physical attributes, endurance, and strength of Vietnamese youth are classified below the standard. In addition, people with a range of chronic conditions are being rejuvenated in Vietnam; the prevalence of overweight and obese youngsters is rising; people in there are also listed as "short and small" of the globe... (World Health Organization, 2019). This issue will be researched further so that a reliable foundation may be laid for providing physical development solutions for secondary students of Vietnam and of Hanoi suburbs under present conditions.

VIII. CONCLUSION

12 criteria have been identified (4 items of morphological traits, 7 items of physical strength, and 1 item of physical functions) to measure the physical fitness of secondary students in the Hanoi suburbs.

In terms of morphological factors, strength, and flexibility, the current secondary school children in Hanoi's outskirts outperform Vietnamese people of the same age and gender in 2001; superior in speed and dexterity at some ages, and comparable in endurance and other physical functions.

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