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Physical Condition of Students (GRADES 1-2) in Primary Schools in Hanoi City

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Abstract— This study aims to assess the physical status of primary school students from grades 1 to 2 in Hanoi, focusing on anthropometric indicators and basic motor skills. Using a combination of actual measurement and survey methods, the study collected data on students' height, weight, BMI, strength, endurance, and flexibility. The results showed apparent differences between age groups and genders, with many students not achieving optimal physical development. This suggests appropriate physical education programs and a balanced diet to support children's comprehensive development.

Keywords— student physical fitness, physical development, anthropometry, BMI index, primary school students.

I. INTRODUCTION

Physical development in primary school plays a vital role in forming the foundation for children's health, mobility, and physical strength in the future. In particular, children aged 6 to 8 (grades 1 - 2) experience strong growth in height, weight, endurance, and motor coordination. Accurate monitoring and assessment of physical indicators help identify students' health status and provide a scientific basis for developing appropriate physical education programs.

Hanoi is a city with a clear differentiation between urban and rural areas, leading to differences in nutrition, exercise, and living environment for primary school students. To have a more comprehensive and accurate view of the physical condition of children here, it is necessary to identify indicators and physical fitness tests suitable for actual conditions. These indicators help monitor children's development and support schools, physical education teachers, and management agencies in designing more effective training activities.

This study aims to determine the fundamental indicators and appropriate test systems for assessing the physical fitness of primary school students (grades 1-2) in Hanoi. The research results will be an essential basis for improving the quality of physical education and contributing to the health and comprehensive development of children in this age group.

Research method:

The thesis used the following research methods during the research process: Document analysis and synthesis, interviews, pedagogical testing, medical testing, and mathematical statistics.

II. RESEARCH RESULTS

2.1 Determining Indicators and physical assessment tests for primary school students (grades 1-2) in Hanoi City

The determination of indicators and physical assessment tests for primary school students (grades 1-2) is carried out in the following steps:

- Synthesis of relevant Research works on the physical investigation of Vietnamese people [3]; ASEAN physical assessment indicators [6]; Decision 53/BGDĐT-QĐ 2008 of the Ministry of Education and Training of Vietnam on physical assessment of students [1].

- Interviewing experts and scientists. The results have identified 09 indicators and tests to assess the physical fitness of primary school students (grades 1-2) in Hanoi. These are the indicators:

1. Standing height (cm)

2. Weight (kg)

3. BIM index (kg/m2)

4. Dominant grip strength (kg)

5. Supine sit-ups (number of times/30 seconds)

6. On-the-spot long jump (cm)

7. 30m XPC run (seconds)

8. 4x10m shuttle run (seconds)

9. 5-minute free run (m)

2.2. Physical status of primary school students (grades 1-2) in Hanoi city

The topic involves physical examination of students in grades 1 and 2. The specific number of research samples is 557 students from grades 1 to 2 (Male = 301 students, female = 256 students). Grade 1 has a total of 277 students, 127 male students, and 120 female students. Grade 2 has a total of 280 students, 144 male students, and 280 female students.

The test results were compared with the physical standards of the Ministry of Education and Training, the results of the people's physical survey

The test results are presented from table 1 to table 4.

Table 1 shows the physical test results of first graders at some primary schools in Hanoi. These results reflect fundamental indicators such as height, weight, BMI, hand strength, speed, endurance, and motor coordination ability of male and female students.

Table 1. Results of physical examination of students at some primary schools in Hanoi - Grade 1

No	Content	Male (n=157)				Female (n=120)			
		$\bar{x}$	δ	*Mx*	*Cv*	$\bar{x}$	δ	*Mx*	*Cv*
1	Standing height (cm)	118,32	8,01	0,64	0,07	114,92	7,58	0,69	0,07
2	Weight (kg)	26,68	4,01	0,32	0,15	24,3	4,81	0,44	0,2
3	BIM index (kg/m2)	19,20	3,30	0,26	0,17	18,49	3,8	0,35	0,21
4	Dominant grip strength (kg)	10,59	1,02	0,08	0,1	9,57	0,98	0,09	0,1
5	Supine sit-ups (number/30 seconds)	6,75	2,26	0,18	0,33	4,98	1,55	0,14	0,31
6	On-the-spot long jump (cm)	106,78	5,8	0,46	0,05	99,31	4,07	0,37	0,04
7	30m XPC run (seconds)	6,82	0,56	0,04	0,08	7,96	0,43	0,04	0,05
8	4x10m shuttle run (seconds)	13,61	0,63	0,05	0,05	13,77	0,61	0,06	0,04
9	5-minute effort run (m)	697,44	33,3	2,66	0,05	658,16	35,53	3,24	0,05

Table 2. Results of physical fitness classification of students according to Decision 53/2008/BGDĐT-QD of the Ministry of Education and Training - Grade 1

No	Content	Male (n=157)						Female (n=120)					
		Good	*%*	*Obtain*	*%*	*Not achieved*	*Good*	*Good*	*%*	*Obtain*	*%*	*Not achieved*	*Good*
1	ominant grip strength (kg)	40	25,48	108	68,79	9	5,73	26	21,67	88	73,33	6	5
2	upine sit-ups (reps/30s)	14	8,92	135	85,99	8	5,10	27	22,5	88	73,33	5	4,17
3	n-the-spot long jump (cm)	48	30,57	96	61,15	13	8,28	41	34,17	74	61,67	5	4,17
4	0m XPC run (sec)	53	33,76	88	56,05	16	10,19	22	18,33	88	73,33	10	8,33
5	x10m shuttle run (sec)	54	34,39	87	55,41	16	10,19	39	32,5	75	62,5	6	5
6	-minute free run (m)	11	7,01	139	88,54	7	4,46	19	15,83	97	80,83	4	3,33
7	verall average rate	37	23,57	109	69,43	12	7,64	29	24,17	85	70,83	6	5
8	**verall fitness rating**	**24**	**15,29**	**99**	**63,06**	**33**	**21,02**	**14**	**11,67**	**83**	**69,17**	**23**	**19,17**

Table 3. Results of physical examination of students at some primary schools in Hanoi - Grade 2

No	Content	Male (n=144)				Female (n=136)			
		$\overline{x}$	δ	*Mx*	*Cv*	$\overline{x}$	δ	*Mx*	*Cv*
1	Standing height (cm)	121,7	7,58	0,63	0,06	120,48	7,41	0,64	0,06
2	Weight (kg)	31,5	6,29	0,52	0,2	30,9	5,21	0,45	0,17
3	BIM index (kg/m2)	21,35	4,46	0,37	0,21	21,3	3,22	0,28	0,15
4	Dominant grip strength (kg)	12,3	1,04	0,09	0,08	11,22	1,11	0,1	0,1
5	Supine sit-ups (number/30 seconds)	8,7	2,27	0,19	0,26	6,77	1,73	0,15	0,26
6	On-the-spot long jump (cm)	125,96	6,27	0,52	0,05	117,98	6,27	0,54	0,05
7	30m XPC run (seconds)	6,65	0,41	0,03	0,06	7,65	0,48	0,04	0,06
8	4x10m shuttle run (seconds)	13,51	0,49	0,04	0,04	13,59	0,53	0,05	0,04
9	5-minute effort run (m)	726,49	36,8	3,07	0,05	705,13	47,18	4,05	0,07

Table 4. Results of physical fitness classification of students according to Decision 53/2008/BGDĐT-QD of the Ministry of Education and Training - Grade 2

No	Content	Male (n=144)						Female (n=136)					
		Good	*%*	*Obtain*	*%*	*Not achieved*	*%*	*Good*	*%*	*Obtain*	*%*	*Not achieved*	*Good*
1	Dominant grip strength (kg)	32	22,22	107	74,31	5	3,47	31	22,79	97	71,32	8	5,88
2	Supine sit-ups (reps/30s)	41	28,47	100	69,44	3	2,08	63	46,32	69	50,74	4	2,94
3	On-the-spot long jump (cm)	19	13,19	124	86,11	1	0,69	32	23,53	102	75	2	1,47
4	30m XPC run (sec)	36	25	102	70,83	6	4,17	41	30,15	90	66,18	5	3,68
5	4x10m shuttle run (sec)	44	30,56	94	65,28	6	4,17	49	36,03	84	61,76	3	2,21
6	5-minute free run (m)	27	18,75	112	77,78	5	3,47	23	16,91	101	74,26	12	8,82
7	Overall average rate	33	22,92	107	74,31	4	2,78	40	29,41	91	66,91	6	4,41
8	Overall fitness rating	25	17,36	103	71,53	16	11,11	37	27,21	78	57,35	21	15,44

III. RESULTS

Research results in table 1

Compare fundamental physical indicators (Height, weight, BMI)

Height: Male students had an average height of 118.32 cm, higher than females (114.92 cm). This difference is consistent with the general growth trend of children, where males tend to have a faster growth rate in the early stages. However, the level of variation was relatively low (Cv = 0.07 for both males and females), indicating that the height of students in the survey sample was relatively uniform.

Weight: On average, male students weighed 26.68 kg, higher than female students (24.3 kg). However, the difference was insignificant, and the variation in females (Cv = 0.2) was higher than in males (Cv = 0.15), indicating that female weight had more excellent dispersion in the sample group.

BMI (kg/m²): Male students had an average BMI of 19.20, while female students had 18.49. Although the BMI of both groups was within the normal range according to World Health Organization (WHO) standards, the higher Cv values (0.17 in males and 0.21 in females) indicated a more significant difference in body condition in the female group.

Muscular strength and endurance

Dominant grip strength: Male students' average grip strength is 10.59 kg, higher than that of females (9.57 kg), consistent with males' biological characteristics of tending to develop better muscle strength. However, the fluctuation is relatively low (Cv = 0.1), indicating that the difference between students is insignificant.

Lying abdominal crunches (number of times/30 seconds): Male students perform an average of 6.75 times, higher than females (4.98 times). This difference shows the difference in abdominal strength between the two sexes, which may be due to biological characteristics or

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different levels of exercise.

On-the-spot long jump: Male students achieve an average of 106.78 cm, significantly higher than females (99.31 cm). This reflects the better jumping ability and leg strength of males.

Ability to move quickly and coordinate movements

30m high start sprint (XPC): Male students had an average time of 6.82 seconds, faster than females (7.96 seconds). This is consistent with the fact that males tend to have faster reflexes and better leg strength. 4x10m shuttle run: Male students had an average time of 13.61 seconds, faster than females (14.03 seconds), but the difference was insignificant. This shows that the ability to move flexibly and coordinate between both sexes is not much different.

Endurance and stamina

5-minute free-running: Male students ran an average of 697.44 m, higher than female students (658.16 m). This difference reflects that male students' endurance and stamina are usually better, although the variation is insignificant (Cv = 0.05 for both sexes).

In summary, the physical tests of first-grade students in Hanoi show significant differences between males and females in physical fitness, strength, mobility, and endurance indicators. Male students tend to be taller, heavier, stronger, and faster than female students. However, the difference is not too significant, indicating that physical development in the early stages of primary school is still relatively even.

The results of Table 2 show the physical development level of male and female students from grade 1 to grade 2. Analyzing this data helps to assess the percentage of students meeting physical requirements, compare the differences between the two genders, and make recommendations to improve the quality of physical education in schools.

General assessment of male and female students' physical fitness

In general, the proportion of students meeting the physical fitness requirements (classified as "Good" and "Achieved") was relatively high for both boys (78.48%) and girls (80.83%), indicating that the majority of first graders had physical fitness that met the minimum requirements as prescribed by the Ministry of Education and Training. However, there was a notable difference in the number of students achieving the "Good" level: Boys (15.29%) were higher than girls (11.67%), indicating that boys tended to be superior in overall physical fitness.

On the other hand, the proportion of "Not

Achieved" students was higher for boys (21.02%) than for girls (19.17%), indicating that there was a group of boys who did not meet the physical fitness requirements, possibly due to differences in their ability to adapt to the training program or nutritional and lifestyle factors. According to the study by Malina et al. (2004), males are generally better able to develop muscle strength and speed than females due to differences in hormones and body structure. However, the "Not yet achieved" rate difference shows that not all males are physically better than females. Still, it also depends on other factors such as diet, frequency of exercise, and physical education in school.

Compare by test content.

Dominant grip strength (kg): 25.48% of male students were classified as Good, while only 21.67% of female students were classified as Good. This is consistent with the general trend that males have better arm strength. The percentage of "Not achieved" students was very low in both genders (5.73% in males and 5% in females), indicating that most students had arm strength that met the minimum requirements.

Supine sit-ups (number of times/30 seconds): The percentage of male students who met the requirements (85.99%) was higher than that of female students (73.33%), reflecting better endurance and strength of male abdominal muscles. The percentage of "Not achieved" in females (4.17%) was lower than that in males (5.10%), indicating that female students were more consistent in their ability to perform this exercise.

On-the-spot long jump (cm): The "Good" rating of males (30.57%) and females (34.17%) is quite similar, showing that long jump ability does not have too big a difference between the two sexes at this age. However, the "Not yet achieved" rate of males (8.28%) is higher than that of females (4.17%), showing that some male students have not developed their jumping ability well. 30m High Start (XPC) and 4x10m Shuttle Run: Boys had a higher "Good" rate than girls in both speed tests: 30m XPC: Boys 33.76%, girls 18.33%. 4x10m Shuttle Run: Boys 34.39%, girls 32.5%. This confirms that boys have faster reflexes and better running speed than girls. However, the "Not yet" rate was also higher in boys, indicating that some students have not developed well in terms of speed and flexibility.

Running at will for 5 minutes (m): The percentage of students meeting the requirements is very high (88.54% for boys and 80.83% for girls), but the number of students reaching the "Good" level is low (7.01% for boys and 15.83% for girls). This shows that the endurance and stamina of students are still not high and need to be improved through a more persistent training program. It

can be seen that The results of physical fitness classification according to Decision 53/2008/BGDĐT-QD of the Ministry of Education and Training show that the majority of first graders in Hanoi have physical fitness that meets the requirements, with a high percentage of "Meeting" and "Good" (78-80%). However, there were apparent differences between boys and girls in some areas: Boys tended to be stronger in muscle strength and speed but also had a higher rate of "Not Yet Achieved." Girls were more evenly matched in physical fitness but needed to improve their endurance and muscle strength. These findings suggest that physical education programs should design exercises appropriate for each gender while focusing on improving endurance and flexibility to help students develop more comprehensive physical fitness.

Table 3 presents the results of physical examinations of second graders at some primary schools in Hanoi, including indicators of height, weight, strength, speed, and endurance. Analyzing these data helps assess the physical development level of male and female students. It compares it with previous studies to make scientific judgments about the physical development trends of Vietnamese children.

General physical assessment of 2nd grade students

In most test contents, male students had higher physical development indicators than female students.

The average height of males (121.7 cm) was higher than that of females (120.48 cm), but the difference was insignificant. This is consistent with the general development trend of children at this age.

The average weight of males (31.5 kg) was also slightly higher than that of females (30.9 kg), with a relatively large standard deviation (6.29 kg for males and 5.21 kg for females), indicating a clear differentiation between students in the same group.

Research by Malina & Bouchard (2004) showed that in the pre-pubertal stage, the difference in height and weight between males and females was insignificant. Still, males tended to develop more muscle, while females had higher body fat. The results in Table 3 are consistent with this trend.

Detailed analysis of each test content

BMI (kg/m²): Boys had an average BMI of 21.35 kg/m², slightly higher than girls (21.3 kg/m²), indicating similar levels of physical development between the two sexes. The standard deviation of BMI in boys (4.46) was higher than that of girls (3.22), reflecting more significant differences in physical development among boys. According to WHO (2020), children's BMI can vary with age and physical development. The similarity between male and female BMI in grade 2 suggests no apparent differences in physical development. Still, the high standard deviation in boys may indicate an imbalance in diet or uneven levels of physical activity.

Dominant grip strength (kG): Boys had an average grip strength of 12.3 kG, higher than girls (11.22 kG), with a low standard deviation (1.04 in boys and 1.11 in girls). The coefficient of variation (Cv) was almost the same (0.08 in boys and 0.1 in girls), indicating a relatively even distribution in the group. Hand grip strength is an index reflecting the development of the musculoskeletal system. According to Armstrong & Welsman (2007), differences in muscle strength between boys and girls began to appear at an elementary school age, which is consistent with that trend.

Lying back sit-ups (number of times/30 seconds): Boys had a higher average number of sit-ups than girls (8.7 times compared to 7.73 times). The coefficient of variation for boys (0.26) was higher than for girls (0.26), indicating a relatively large degree of differentiation among students in their ability to perform this exercise. Rowland's (2005) study found that sit-ups reflect the strength of the abdominal and lower back muscles. This result is consistent with boys' tendency to develop better muscles, making this movement easier.

Long jump on the spot (cm): Male students have an average long jump of 125.96 cm, higher than that of females (117.98 cm), with a similar standard deviation (6.27 cm for males and 6.27 cm for females). This difference reflects the difference in leg muscle strength between the two sexes. According to the study of Harrison et al. (2001), long jump ability is affected by leg muscle strength and jumping technique. This result is consistent with the general trend that males have better-developed leg muscles.

30m XPC run: Male students had an average time of 6.65 seconds, faster than females (6.77 seconds). The coefficient of variation was very low (0.04 in both groups), indicating high uniformity in sprinting ability.

4x10m shuttle run: Male students' average time was 13.51 seconds, faster than females' (13.59 seconds). The coefficient of variation was low (0.04 in both groups), indicating low differentiation.

5-minute free run (m): Male students ran an average of 726.49 m, higher than females (705.13 m). The standard deviation in females (47.18 m) was more significant than that in males (36.8 m), indicating a more precise differentiation in endurance in the female group.

In summary, Table 3 shows that second graders

have a steady physical development, with some differences between boys and girls: Boys outperform girls in muscle strength (grip strength, long jump, sit-ups) and speed (30m dash, shuttle run). Girls have higher uniformity in many tests but must improve muscle strength and endurance. These findings suggest that physical education programs should design exercises suitable for each gender, helping students develop more comprehensive physical fitness.

Table 4 shows the results of the physical fitness classification of second-grade students according to Decision 53/2008/BGDĐT-QD of the Ministry of Education and Training, based on tests such as grip strength, running, long jump, and endurance. Analyzing these data helps assess the physical development level of male and female students, thereby proposing appropriate adjustments in the physical education program.

General assessment of physical fitness of grade 2 students

The results of the general physical fitness classification show that 25 male students (17.36%) achieved Good, 103 students (71.53%) achieved Pass, and 16 students (11.11%) did not achieve. Thirty-seven female students (27.21%) achieved Good, 78 students (57.35%) achieved Pass, and 21 students (15.44%) did not achieve.

In general, the rate of students meeting the requirements (Good + Pass) in males (88.89%) is higher than in females (84.56%). However, the rate of female students achieving Good is higher than that of males (27.21% compared to 17.36%), indicating that a group of female students have better physical condition than average.

According to Malina & Bouchard (2004), physical development between boys and girls in early primary school is not significantly different. However, girls tend to perform better in tests requiring flexibility and endurance, which may explain the higher Good rating in girls.

Detailed analysis of each test content

Dominant hand grip strength (kg): Male students: 22.22% achieved Good, 74.31% achieved Pass, and 3.47% did not achieve. Female students: 22.79% achieved Good, 71.32% achieved Pass, 5.88% did not achieve. The difference between the two groups was not significant, but the rate of failure in females was higher than in males (5.88% compared to 3.47%). According to Armstrong & Welsman (2007), hand muscle strength is more developed in males than in females, which may explain why the rate of failure in females is higher. Lying back sit-ups (number of times/30 seconds): Male students: 28.47% achieved Good, 69.44% achieved Pass, only 2.08% did not achieve.

Female students: 46.32% achieved Good, 50.74% achieved Pass, 2.94% did not achieve. The rate of achieving Good in females was higher than that of males (46.32% compared to 28.47%). This is one of the tests that female students performed better on, consistent with Rowland's (2005) study that female students are better able to perform abdominal exercises due to different body fat percentages and muscle distribution than males.

Long jump on the spot (cm): Male students: 13.19% achieved Good, 86.11% achieved Pass, only 0.69% did not achieve. Female students: 23.53% achieved Good, 75.83% achieved Pass, 1.47% did not achieve. Although the rate of achieving Good was higher in females than in males (23.53% compared to 13.19%), achieving Pass was higher in males than in females (86.11% compared to 75.83%). The long jump is a test to assess leg muscle strength, and this result is slightly different from the general trend where males tend to have better-developed leg muscles. However, this result may be influenced by technical factors or the distribution of physical strength in the study sample. 30m high start sprint (XPC): Male students: 25.16% achieved Good, 70.83% achieved Pass, 3.83% did not achieve. Female students: 31.40% achieved Good, 66.18% achieved Pass, 3.68% did not achieve. 4x10m shuttle run (seconds): Male students: 30.56% achieved Good, 65.28% achieved Pass, 4.17% did not achieve. Female students: 36.03% achieved Good, 61.76% achieved Pass, 2.21% did not achieve. The rate of achieving Good in females is higher than in males (36.03% compared to 30.56%). Shuttle run assesses the ability to move quickly and flexibly. This difference may be because female students are lighter, so it is easier to change the direction of movement.

5-minute run (m): Male students: 18.75% achieved Good, 77.78% achieved Pass, 3.47% did not achieve. Female students: 16.83% achieved Good, 74.26% achieved Pass, 8.82% did not achieve. The rate of failure in females is higher than that in males (8.82% compared to 3.47%), indicating that the endurance of male students is slightly better. According to Rowland (2005), the cardiovascular system of male students often works more effectively when performing endurance exercises, which may explain why the rate of failure in females is higher. Summary: Boys tend to outperform girls in strength tests (grip, long jump) and endurance (5-minute dash). Girls perform better in tests requiring agility and short-term speed (30-meter dash, shuttle run). Boys are more likely than girls to achieve a pass (Good + Pass), but girls are more likely than boys to achieve a pass on many tests.

2. Comparing the physical fitness of grade 1 and 2 students with related Research works

Table 5 is the result of comparing the body shape of first graders in Hanoi and other provinces such as Can Tho, Da Nang, and Son La, based on the results of the physical survey of Vietnamese people according to ASEAN criteria (conducted in 2020 by the Institute of Sports Science) not only helps to identify the difference in physical condition between regions.

Average height

Urban male students: Hanoi (118.7 cm) is shorter than Can Tho (129 cm, $p<0.01$), Da Nang (127.7 cm, $p<0.01$), and Son La (123.4 cm, $p<0.01$).

Rural male students: Hanoi (118.1 cm) is shorter than Can Tho (123 cm, $p<0.01$), Da Nang (121.3 cm, $p<0.01$), and Son La (121.6 cm, $p<0.01$).

Urban female students: Hanoi (114.1 cm) is shorter than Can Tho (125.1 cm, $p<0.01$), Da Nang (121.9 cm, $p<0.01$), and Son La (118.2 cm, $p<0.01$).

Rural female students: Hanoi (115.1 cm) is shorter than Can Tho (121.7 cm, $p<0.01$), Da Nang (121.9 cm, $p<0.01$), and Son La (121.2 cm, $p<0.01$). Thus, grade 1 students in Hanoi have a significantly lower average height than students in other provinces, especially Can Tho. This may reflect differences in nutrition, living conditions, genetic factors, and physical exercise regimens.

Average weight

Urban male students: Hanoi (26.85 kg) is lower than Can Tho (33.6 kg, $p<0.01$), Da Nang (30.69 kg, $p<0.01$), and Son La (24.22 kg, $p<0.01$).

Rural male students: Hanoi (26.46 kg) is lower than Can Tho (30.4 kg, $p<0.01$), Da Nang (28.1 kg, $p<0.01$), but there is no significant difference with Son La (25.45 kg, $p>0.05$).

Urban female students: Hanoi (23.16 kg) is lower than Can Tho (28.38 kg, $p<0.01$) and Da Nang (28.03 kg, $p<0.01$), but there is no difference with Son La (36.92 kg, $p>0.05$).

Rural female students in Hanoi (22.68 kg) were lower than those in Can Tho (27.2 kilograms, $p<0.01$) and Da Nang (24.1 kg, $p<0.01$), but there was no difference with Son La (26.81 kg, $p>0.05$). Thus, The average weight of students in Hanoi was lower than that in Can Tho and Da Nang, especially in the group of male students. However, the difference with Son La was insignificant, suggesting there may be similarities in diet and living standards between Hanoi and Son La compared to the remaining areas.

BMI index (kg/m²):

Urban male students: Hanoi (19.23) did not differ significantly from Can Tho (19.98, $p>0.05$), but were lower than Da Nang (21.14, $p<0.01$) and Son La (15.61, $p<0.01$).

Rural male students: Hanoi (19.07) did not differ significantly from Can Tho (19.91, $p>0.05$) but was higher than Son La (17.06, $p<0.01$).

Urban female students: Hanoi (17.96) did not differ significantly from Can Tho (18.03, $p>0.05$), but were lower than Da Nang (18.89, $p<0.01$).

Rural female students: Hanoi (17.26) did not differ significantly from Can Tho (17.57, $p>0.05$) but were lower than Da Nang (19.23, $p<0.01$).

The BMI index of Hanoi students is not much different from Can Tho but is significantly lower than Da Nang. This may be due to the difference in dietary structure, which allows students in Da Nang to have a more reasonable amount of nutrition.

Overall assessment: Students in Hanoi have lower physical fitness than those in the southern and central provinces, especially Can Tho and Da Nang. Nutritional differences may be the leading cause, as students in the west and central regions have higher protein and fat diets. Policies are needed to improve nutrition and physical training for students in Hanoi, especially primary school students, to narrow the gap in physical development between regions. Further Research on the impact of environmental factors, lifestyle, and nutrition is needed to develop appropriate solutions.

Table 6 compares second graders in Hanoi with those in Can Tho, Da Nang and Son La provinces based on the physical fitness survey of Vietnamese people according to ASEAN criteria (Institute of Sports Science, 2020). This result shows significant differences between regions, helping to clarify the impact of environmental and nutritional conditions on children's development.

Table 5. Comparison of body morphology test results of Hanoi students with students from other provinces according to the results of the Vietnamese physical fitness survey according to ASEAN criteria (2020 by the Institute of Sports Science) - Grade 1

Subjects	Area	Index	Hanoi		Can Tho		t	P	Da Nang		t	P	Son La		t	P
			$\bar{x}$	δ	$\bar{x}$	δ			$\bar{x}$	δ			$\bar{x}$	δ		
Male	Urban (n=77)	Height (cm)	118,7	7,88	129	0,04	11,47	<0.01	127,7	0,05	10,02	<0.01	123,4	9,82	3,28	<0.01
		Weight (kg)	26,85	4	33,6	5,88	8,33	<0.01	30,69	6,05	4,65	<0.01	24,22	7,49	2,72	<0.01
		BMI (kg/m2)	19,23	3,62	19,98	2,59	1,48	>0.05	11,99	2,21	14,98	<0.01	15,61	3	6,76	<0.01
	Rural (n=80)	Height (cm)	118,1	8,17	123	0,04	5,36	<0.01	121,3	0,04	3,5	<0.01	121,6	6,52	2,99	<0.01
		Weight (kg)	26,46	4,03	30,4	7,13	4,3	<0.01	24,81	2,92	2,97	<0.01	25,45	4,93	1,42	>0.05
		BMI (kg/m2)	19,07	2,98	19,91	3,45	1,65	>0.05	10,21	1,07	25,03	<0.01	17,06	2,16	4,88	<0.01
Female	Urban (n=59)	Height (cm)	114,19	7,53	125,1	0,05	11,13	<0.01	121,6	3,9	6,71	<0.01	118,2	5,43	3,32	<0.01
		Weight (kg)	23,16	4,64	28,38	6,57	4,98	<0.01	28,03	4,21	5,97	<0.01	36,92	51,39	2,05	<0.05
		BMI (kg/m2)	17,96	4,13	18,03	3,59	0,1	>0.05	18,89	2,28	1,51	>0.05	26,81	38,37	1,76	>0.05
	Rural (n=61)	Height (cm)	115,1	7,76	124,4	0,06	9,36	<0.01	121,9	7,31	4,98	<0.01	121,2	4,96	5,17	<0.01
		Weight (kg)	22,68	4,72	27,2	5,78	4,73	<0.01	24,89	7,14	2,02	<0.05	22,62	4,15	0,07	>0.05
		BMI (kg/m2)	17,26	3,88	17,57	3,49	0,46	>0.05	16,49	2,99	1,23	>0.05	15,42	2,75	3,02	<0.01

Table 6. Comparison of body morphology test results of Hanoi students with students from other provinces according to the results of the Vietnamese physical fitness survey according to ASEAN criteria (2020 by the Institute of Sports Science) - Grade 2

Subjects	Area	Index	Hanoi		Can Tho		t	P	Da Nang		t	P	Son La		t	P
			$\bar{x}$	δ	$\bar{x}$	δ			$\bar{x}$	δ			$\bar{x}$	δ		
Male	Urban (n=71)	Height (cm)	120,32	7,5	135	0,04	16,49	<0.01	135	0,07	16,49	<0.01	126	4,74	5,39	<0.01
		Weight (kg)	30,98	6,34	39,98	6,08	8,63	<0.01	38,14	6,93	6,42	<0.01	26,6	11,03	2,9	<0.01
		BMI (kg/m2)	21,48	4,51	21,9	2,65	0,68	>0.05	14,01	1,92	12,84	<0.01	16,63	5,9	5,5	<0.01
	Rural (n=73)	Height (cm)	123,05	7,47	128	0,03	5,66	<0.01	130	0,05	7,95	<0.01	125,2	3,33	2,25	<0.05
		Weight (kg)	32,01	6,25	33,2	10,92	0,81	>0.05	32,58	6,45	0,54	>0.05	26,08	6,03	5,83	<0.01
		BMI (kg/m2)	21,24	4,43	20,06	6,13	1,33	>0.05	12,54	2,27	14,93	<0.01	16,53	3,24	7,33	<0.01
Female	Urban (n=67)	Height (cm)	120,45	7,36	130	0,01	10,62	<0.01	125	0,03	5,06	<0.01	130,2	7,49	7,6	<0.01
		Weight (kg)	30,99	5,09	37,12	4,29	7,54	<0.01	26,75	4,16	5,28	<0.01	29,03	7,54	1,76	>0.05

	BMI (kg/m2)	21,4	3,39	21,85	2,44	0,88	>0.05	17,23	2,54	8,06	<0.01	16,9	3,01	8,12	<0.01
	Height (cm)	120,51	7,52	130	4,97	8,75	<0.01	125,5	6,08	4,29	<0.01	121	3,13	0,5	>0.05
Rural (n=69)	Weight (kg)	30,81	5,37	33,23	4,36	2,91	<0.01	24,66	4,75	7,13	<0.01	19,93	1,31	16,35	<0.01
	BMI (kg/m2)	21,2	3,06	19,63	2,01	3,56	<0.01	15,6	2,44	11,89	<0.01	13,62	0,84	19,84	<0.01

Table 7. Comparison of physical fitness test results of Hanoi students with physical fitness survey results in 2001 - Grade 1

No		Male				t	P	Female				t	P
		Nationwide		Hanoi				Nationwide		Hanoi			
		$\bar{x}$	δ	$\bar{x}$	δ			$\bar{x}$	δ	$\bar{x}$	δ		
1	Dominant grip strength (kg)	10,3	2,26	10,59	1,02	1,47	>0.05	9,3	2,07	9,57	0,98	1,29	>0.05
2	Supine sit-ups (reps/30s)	6,5	4,47	6,75	2,26	0,63	>0.05	4,5	4,4	4,98	1,55	1,13	>0.05
3	On-the-spot long jump (cm)	112	16,4	106,78	5,8	3,76	**<0.01**	102	15,5	99,31	4,07	1,84	>0.05
4	30m XPC run (sec)	7,1	0,76	6,82	0,56	3,72	**<0.01**	7,8	0,9	7,96	0,43	1,76	>0.05
5	4x10m shuttle run (sec)	13,8	0,89	13,61	0,63	2,18	**<0.05**	14	0,91	13,77	0,61	2,3	**<0.05**
6	5-minute effort run (m)	718	117	697,44	33,3	2,12	**<0.05**	667	107	658,16	35,53	0,86	>0.05

Table 8. Comparison of physical fitness test results of Hanoi students with physical fitness survey results in 2001 - Grade 2

No		Male				t	P	Female				t	P
		Nationwide		Hanoi				Nationwide		Hanoi			
		$\bar{x}$	δ	$\bar{x}$	δ			$\bar{x}$	δ	$\bar{x}$	δ		
1	Dominant grip strength (kg)	20,4	4,04	12,3	1,04	23,3	**<0.01**	11	2,24	11,22	1,11	1,03	>0.05
2	Supine sit-ups (reps/30s)	7,5	3,2	8,7	2,27	3,67	**<0.01**	5,5	3,5	6,77	1,73	3,79	**<0.01**
3	On-the-spot long jump (cm)	125	17,5	125,96	6,27	0,62	>0.05	116	15,9	117,98	6,27	1,35	>0.05
4	30m XPC run (sec)	6,7	0,68	6,65	0,41	0,76	>0.05	7,3	0,8	7,65	0,48	4,38	**<0.01**
5	4x10m shuttle run (sec)	13,7	0,72	13,51	0,49	2,62	**<0.01**	13,9	0,81	13,59	0,53	3,73	**<0.01**
6	5-minute effort run (m)	744	120	726,49	36,8	1,67	>0.05	699	117	705,13	47,18	0,57	>0.05

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Journal of Humanities and Education Development (JHED)
J. Humanities Educ. Dev.- 7(2)-2025

Comparison of body mass index between regions

- Average height

Urban male students: Hanoi (120.32 cm) is significantly shorter than Can Tho (135 cm, p<0.01), Da Nang (135 cm, p<0.01) and Son La (126 cm, p<0.01).

Rural male students: Hanoi (123.05 cm) is shorter than Can Tho (128 cm, p<0.01), Da Nang (130 cm, p<0.01) and Son La (125.2 cm, p<0.05).

Urban female students: Hanoi (120.45 cm) is shorter than Can Tho (130 cm, p<0.01), Da Nang (125 cm, p<0.01) and Son La (130.2 cm, p<0.01).

Rural female students: Hanoi (120.51 cm) is shorter than Can Tho (130 cm, p<0.01) and Da Nang (125.5 cm, p<0.01), but there is no difference with Son La (121 cm, p>0.05).

In summary, Hanoi students have a significantly lower average height than those in the southern provinces (Can Tho) and the central provinces (Da Nang). The reason may come from the nutritional regime, as previous studies (Nguyen Cong Khan, 2019) have shown that children in the West have a protein-rich diet due to abundant aquatic resources. Notably, Son La - a mountainous province, has a higher average height than Hanoi, which may reflect the influence of genetic factors and the more active habits of children in the highlands.

- Average weight

Urban male students: Hanoi (30.98 kg) is lower than Can Tho (39.98 kg, p<0.01), Da Nang (38.14 kg, p<0.01) but higher than Son La (26.6 kilograms, p<0.01).

Rural male students: Hanoi (32.01 kg) is lower than Da Nang (32.58 kg, p<0.05) and is not different from Can Tho (33.2 kg, p>0.05), but is higher than Son La (26.08 kg, p<0.01).

Urban female students: Hanoi students (30.99 kg) are lower than Can Tho (37.12 kg, p<0.01) and Da Nang (26.75 kg, p<0.01) but are not different from Son La (29.03 kg, p>0.05).

Rural girls: Hanoi (30.81 kg) was lower than Can Tho (33.23 kg, p<0.01) but not different from Da Nang (24.66 kg, p>0.05) and Son La (19.93 kg, p<0.01).

In summary, Hanoi children were heavier than Can Tho and Da Nang, especially in the urban male group. Son La had the lowest weight, possibly due to more limited nutritional conditions in the mountainous area.

- BMI (kg/m²)

Urban male students: Hanoi (21.48) is not different from Can Tho (21.9, p>0.05) but lower than Da Nang (21.92, p<0.01) and higher than Son La (16.63, p<0.01).

Rural male students: Hanoi (21.24) is not different from Can Tho (20.06, p>0.05) but higher than Son La (16.53, p<0.01).

Urban female students: Hanoi (21.4) is not different from Can Tho (21.85, p>0.05) but lower than Da Nang (17.23, p<0.01).

Rural female students: Hanoi (21.2) is not different from Can Tho (19.63, p>0.05) but higher than Son La (13.62, p<0.01).

In summary, the BMI of Hanoi students is similar to Can Tho's but significantly lower than Da Nang's. Son La students have the lowest BMI, reflecting the poorer nutritional status in the mountainous areas.

Thus, the above study shows that primary school students in grade 2 in Hanoi have lower physical conditions than those in Can Tho and Da Nang, especially in height and weight. Son La students tend to be underweight and shorter, reflecting the more limited nutritional conditions in the mountainous areas. The BMI of Hanoi students is not significantly different from Can Tho but is lower than Da Nang, indicating differences in dietary structure and physical activity.

Research results of Table 7:

Table 7 compares the physical fitness indicators of first graders in Hanoi with the national average. This analysis aims to assess the difference between Hanoi students' physical fitness and the national average, thereby discussing the influencing factors and proposing solutions to improve physical fitness.

Comparison of hand and abdominal strength

Dominant hand grip strength (kg): Male: Hanoi (10.59 kg) is higher than the national average (10.3 kg), but there is no statistically significant difference (p>0.05). Female: Hanoi (9.57 kg) is higher than the national average (9.3 kg), but there is also no statistical significance (p>0.05).

Lying on back, sit-ups (number of times/30 seconds): Male: Hanoi (6.75 times) is higher than the whole country (6.5 times) but not statistically significant (p>0.05). Female: Hanoi (4.98 times) is higher than the entire country (4.5 times), but also not statistically significant (p>0.05).

Comparison of leg strength and running speed

On-the-spot long jump (cm): Male: Hanoi (106.78 cm) is lower than the whole country (112 cm, p<0.01). Female: Hanoi (99.31 cm) is lower than the entire country (102 cm, p>0.05).

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Journal of Humanities and Education Development (JHED)
J. Humanities Educ. Dev.- 7(2)-2025

High-start 30m run (seconds): Male: Hanoi (6.82 seconds) is faster than the whole country (7.1 seconds, p<0.01). Female: Hanoi (7.96 seconds) is faster than the entire country (7.8 seconds) but not statistically significant (p>0.05).

Overall: Hanoi boys had significantly lower standing long jump performance than the national average, reflecting weaker leg strength, possibly due to a lack of outdoor exercise or differences in physical training methods.

Despite their poorer long jump, Hanoi boys had better 30m running performance, possibly due to greater familiarity with sprinting drills.

Comparison of coordination and endurance

4x10m shuttle run (seconds):Male: Hanoi (13.61 seconds) is faster than the whole country (13.8 seconds, p<0.05).Female: Hanoi (13.77 seconds) is faster than the entire country (14 seconds, p<0.05).

5-minute free run (m):Male: Hanoi (697.44 m) is lower than the whole country (718 m, p<0.05).Female: Hanoi (658.16 m) is lower than the entire country (667 m, p>0.05).

Thus, Hanoi students had significantly faster shuttle runs, indicating better mobility, possibly due to more organized physical education programs in the city's schools. However, Hanoi students had lower 5-minute free-running performance than the national average, indicating that their endurance was not well trained, possibly due to limited exercise space and less outdoor physical activity participation.

General comments: Hanoi students' grip and abdominal strength did not differ significantly from the national average.

Hanoi students had lower standing long jump performance but faster 30m high-start running, reflecting differences in leg strength and speed development.

Hanoi students' ability to coordinate movements (shuttle running) is significantly better than the national average, but their endurance (running at their own pace for 5 minutes) is worse. The reason may be that urban students have less outdoor exercise space, leading to lower endurance. The physical education program in Hanoi may focus on speed exercises rather than endurance.

Research results table 8

1. Compare arm and abdominal strength

Hand grip strength (kg): Male: Hanoi (12.3 kg) is significantly lower than the national average (20.4 kg, p<0.01). Female: Hanoi (11.22 kg) is almost equivalent to the national average (11 kg, p>0.05).

Supine sit-ups (number of times/30 seconds): Male: Hanoi (8.7 times) is higher than the national average (7.5 times, p<0.01). Female: Hanoi (6.77 times) is higher than the national average (5.5 times, p<0.01).

Discussion: The hand grip strength of male students in Hanoi is significantly lower than that of the national average, indicating differences in hand strength development. This may be because city students rarely participate in physical activities that require hand strength, such as climbing and carrying. On the contrary, the number of sit-ups of Hanoi students is significantly higher, indicating better abdominal muscle strength. This may come from the physical education program in Hanoi focusing more on abdominal exercises, or students are used to sitting for long periods, so they develop better abdominal muscles.

2. Comparison of leg strength and running speed

Long jump on the spot (cm): Male: Hanoi (125.96 cm) is almost equivalent to the national level (125 cm, p>0.05). Female: Hanoi (117.98 cm) is nearly equivalent to the national level (116 cm, p>0.05). 30m high start sprint (seconds): Male: Hanoi (6.65 seconds) is almost equivalent to the national level (6.7 seconds, p>0.05). Female: Hanoi (7.65 seconds) is significantly faster than the national level (7.3 seconds, p<0.01).

3. Comparing motor coordination and endurance

4x10m shuttle run (seconds): Male: Hanoi (13.51 seconds) faster than the whole country (13.7 seconds, p<0.01). Female: Hanoi (13.59 seconds) is faster than the entire country (13.9 seconds, p<0.01).

5-minute free run (m): Male: Hanoi (726.49 m) almost equivalent to the whole country (744 m, p>0.05). Female: Hanoi (705.13 m) is practically equivalent to the entire country (699 m, p>0.05). Hanoi students have significantly faster shuttle run times, demonstrating better mobility and speed of changing direction, possibly due to the urban environment requiring faster reflexes in traffic and daily activities.

The 5-minute running speed of Hanoi students did not differ significantly from the national average, indicating that geographical factors do not affect endurance.

General comments: Hanoi male students' grip strength was significantly lower than the national average, but abdominal strength was higher. There was no significant difference in the on-the-spot long jump, but Hanoi female students ran 30m with a high start faster, reflecting differences in speed development. Hanoi

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Journal of Humanities and Education Development (JHED)
J. Humanities Educ. Dev.- 7(2)-2025

students had significantly better 4x10m shuttle performance, demonstrating better mobility. However, endurance did not differ considerably from the national average.

IV. CONCLUSION

Research on the physical condition of primary school students in grades 1 and 2 in Hanoi has clarified the differences between groups of students by age, gender, and living area. The results show that most students have physical conditions that meet the Ministry of Education and Training's physical standards; however, specific differences still need attention.

Physical development by age and gender: Boys are, on average, taller than girls (grade 1: boys 118.32 cm, girls 114.92 cm; grade 2: boys 121.7 cm, girls 120.48 cm), reflecting normal development by gender. Boys are also heavier than girls, but the difference is not significant. The BMI of both sexes is generally within the normal range. However, there is still a proportion of stunted or overweight students that need to be monitored.

Motor and strength: Boys outperform girls in strength tests (grip, long jump) and endurance (5-minute dash). Girls perform better in tests requiring agility and short-term speed (30-meter dash, shuttle run), which may be related to gender differences in physiology. Girls are more likely than boys to score "Good" on many tests, suggesting that girls are more evenly matched in overall fitness.

Compared to other regions, Hanoi students have a lower average height than students in Can Tho, Da Nang, and Son La, indicating differences in nutrition and living conditions. The BMI of Hanoi students is not significantly different from Can Tho but is lower than Da Nang, indicating the need to improve nutrition and physical training to narrow the development gap with other regions.

ARTICLE SOURCE

The article is quoted from the doctoral thesis "Research on physical development solutions for primary school students in Hanoi City" of the Institute of Sports Science, Vietnam. Chief editor: Ly Quoc Bien.

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