

Health-related physical fitness among children aged 6-12 years old in Malaysia: Findings from SEANUTS II



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INTRODUCTION

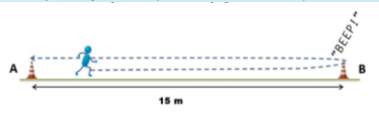
Health-related physical fitness (HRPF) is an important determinant of physical health in children; however, there are limited studies with representative data that assess HRPF among Malaysian children.

OBJECTIVE

The present study investigated HRPF among Malaysian children aged 6-12 years old who participated in the second South East Asian Nutrition Surveys (SEANUTS II).

METHODOLOGY

- Ethical approval was obtained from the Research Ethics Committee of Universiti Kebangsaan Malaysia (RECUKM), while informed consent was from parents/guardians prior study.
- A total of 1238 primary school children (mean age: 9.6±1.7 years, 54% female), from Peninsular Malaysia were included in this study.
- Body weight and height were measured and classified using WHO 2007 BMI-for-age Z-score.
- HRPF was assessed as follows:
 - cardiorespiratory fitness (15-meter shuttle run),



- muscular strength (handgrip strength, standing long jump),
- muscular endurance (sit-ups),



- flexibility (V-sit and reach), and



- body composition (body fat percentage using bioelectrical impedance analysis)
- Physical activity (PA) was assessed by number of days with ≥60 minutes of moderate-to-vigorous PA (MVPA) – parent-reported for children aged 6-9 years, and self-reported by children aged 10-12 years.

RESULTS

Table 1 Sociodemographic and anthropometrics variables for children presented as means and standard deviations.

| | All Participants (n = 1238) |
|-----------------------------|-----------------------------|
| Age (years±SD) | 9.58±1.72 |
| Body weight (kg±SD) | 32.5±12.1 |
| Standing eight (cm±SD) | 134.1±12.0 |
| BMI (kg/m ² ±SD) | 17.55±4.17 |
| BAZ (kg/m ² ±SD) | 0.09±1.62 |

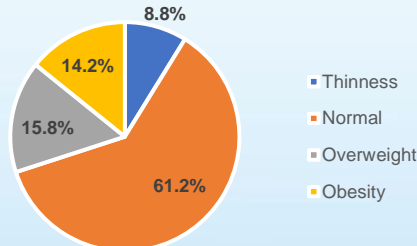


Figure 1 Body weight status among children aged 6-12 years old

- "Figure 1" Overall, prevalence of overweight and obesity were 16% and 14%, respectively.

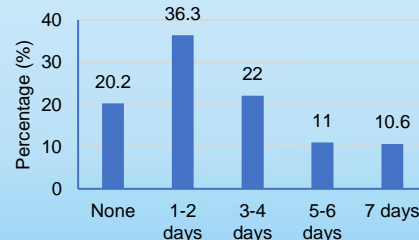


Figure 2 Number of day of ≥60 minutes of MVPA among children aged 6-12 years old

- "Figure 2" Only 11% of children achieved the recommended ≥60 minutes of MVPA daily, while most children reported only 1-2 days ≥60 minutes of MVPA.

Table 2 Physical fitness variables for children presented as means and standard deviations

| | All (n = 1238) | Male (n = 571) | Female (n = 667) |
|---|----------------|----------------|------------------|
| Shuttle run (VO ₂ peak) (ml/kg/min±SD) | 42.6±3.5 | 43.0±3.7 | 42.3±3.3 |
| Handgrip Strength (kg±SD) | 12.5±4.4 | 13.3±4.4 | 11.9±4.2 |
| Standing long jump (cm±SD) | 110.5±26.7 | 118.9±28.7 | 103.3±22.5 |
| Sit-up (reps/min±SD) | 20±10 | 22±10 | 18±8 |
| V-sit & reach (cm±SD) | -0.6±8.9 | -1.6±8.8 | 0.3±8.9 |
| Percentage of body fat (%±SD) | 23.9±9.7 | 23.5±10.3 | 24.3±9.2 |

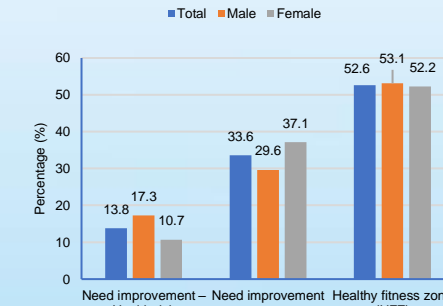


Figure 3 Cardiorespiratory fitness status among children aged 6-12 years old

- "Table 2" Mean peak VO₂ was 42.6±3.5 ml/kg/min. Approximately half of the children did not achieve Healthy Fitness Zone based on FITNESSGRAM® standards, with boys (47%) and girls (48%) at similar proportions (figure 3).
- Mean handgrip strength and standing long jump were 12.5±4.4 kg and 110.5±26.7 cm, respectively, while average repetitions for sit-ups were 20±10 reps/minutes.
- Mean distance achieved in V-sit and reach was -0.6±8.9 cm; while mean body fat percentage was 23.9±9.7%

DISCUSSION

- The prevalence of overweight and obesity in present study was lower compared to a study in Chile (Solis-Urra et al., 2021), but higher than study conducted in China and Japan (Li et al., 2020). In the local context, the prevalence of overweight and obesity was comparable to the NHMS 2019, which reported that 15.0% and 14.8% were having overweight and obesity, respectively (IPH, 2020).
- Mean peak VO₂ in present study was lower compared to study in Canada (Lang, Larouche, and Tremblay, 2019). Approximately half of the children achieved the healthy fitness zone for the cardiorespiratory fitness, which is comparable with the *Healthy Kids and Smart Kids* project in US (Chen et al., 2018), but higher than another study in western US (Ha et al., 2021).
- Mean handgrip strength was lower than studies in Canada (Lang, Larouche, and Tremblay, 2019), Sweden (Henriksson et al., 2022), China (He et al., 2019; Li et al., 2020) and Japan (Li et al., 2020).
- Mean distance achieved by standing long jump in present study was lower compared to studies conducted in Chile (Solis-Urra et al., 2021), Spain (Padilla-Moledo et al., 2020), Sweden (Henriksson et al., 2022), China (Li et al., 2020) and Japan (Li et al., 2020).
- Mean repetition for sit-up test was lower compared to studies in China (Fan and Cao, 2017; Li et al., 2020) and Japan (Li et al., 2020). The muscular fitness and endurance among Malaysian children aged 6-12 years was a concern, as mean for all three physical fitness tests was lower compared to Western and Asian countries.

CONCLUSION

Overall, about one-third of Malaysian children were categorized as overweight/obese. Most children did not meet recommended daily moderate-to-vigorous physical activity, while about half of the children had low levels of cardiorespiratory fitness. More prospective research to assess and improve health-related physical fitness in Malaysian children are needed.

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REFERENCES

Chen, W., He, M., Sassi, F., Flaxman, A., Afshar, A., & Murray, T. (2019). Global burden of physical inactivity and its association with all-cause mortality and disability: a systematic review and meta-analysis. *BMJ Public Health*, 2019. <https://doi.org/10.1136/bmjph-2019-000114>

Chan, K. S., & Koh, D. (2021). Physical fitness among Chinese school children: National prevalence estimates from the 2016 Physical Activity and Fitness in China - The Youth Study. *Journal of Sport and Health Sciences*, 13(8), 881-894. <https://doi.org/10.1080/20777266.2021.1987820>

Ha, H., Ma, J., Chaturvedi, N., Wang, J., McKellop, J., & Gaudin, K. (2021). Health-related fitness levels among US elementary school students. *International Journal of Environmental Research and Public Health*, 18(10), 5242. <https://doi.org/10.3390/ijerph18105242>

He, H., Pan, L., Liu, F., Liu, Y., He, J., Wang, L., Xu, P., He, Z., & Shan, G. (2019). Muscle mass and its association with body mass index in children and adolescents aged 7-18 years in China: A cross-sectional study. *BMJ Open*, 2019. <https://doi.org/10.1136/bmjopen-2019-027154>

Henriksson, B., Sandberg, J., Westman, M., Dohrenstorfer, C., Di, C., Ormgren, F., & Liu, M. (2022). Body composition, physical fitness and cardiovascular risk factors in 8-year-old children. *Scientific Reports*, 12(1), 1-11. <https://doi.org/10.1038/s41598-022-02040-9>

IPH. (2020). National Health and Morbidity Survey (NHMS) 2019. <http://www.nhms.gov.my>

Lang, J., Larouche, M., & Tremblay, R. S. (2019). The association between physical fitness and health in a nationally representative sample of Canadian children and youth aged 6 to 17 years. *Health Promotion and Chronic Disease Prevention in Canada*, 2019, 19(1), 1-11. <https://doi.org/10.2466/03.spm.19.1.00000>

Li, Y., Zhang, C., Chen, G., Wu, R., Li, C., Yang, X., Sun, Y., Li, M., Zhang, T., Lu, Y., Chen, Y., Sun, A., & He, S. (2020). Levels of physical fitness and weight status in children and adolescents: A comparison between China and Japan. *International Journal of Environmental Research and Public Health*, 17(2), 517. <https://doi.org/10.3390/ijerph17020517>

Padilla-Moledo, C., Fernandez-Santana, J. D., Riquelme-Sanchez, S., Sanchez-Carpel, L., del-Castillo, P., Castellano-Baena, A., & Castellano-Baena, A. (2020). Physical fitness and self-reported health and sedentary behaviour in adolescents: A cross-sectional longitudinal study. *International Journal of Environmental Research and Public Health*, 17(1), 284. <https://doi.org/10.3390/ijerph17010284>

Solis-Urra, P., Sanchez-Morales, J., Olmos-Abadilla, J., Castro-Pinero, J., Salazar-Vizcaino, K. P., Flores, G., Rodriguez-Rodriguez, F., Guay, A., Fontecha, C. A., & Castellanos, C. (2021). Physical fitness and its association with cognitive performance in Chinese schoolchildren. *The Singapore Medical Journal*, 2021. <https://doi.org/10.1111/sms15244>