Factors predicting health-related quality of life of the Malaysian B40 school-aged children living in urban-poor flats in the central region of Malaysia

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ABSTRACT

Background and Objectives: Health-related quality of life (HRQoL) is a multidimensional concept that indicated an individual's holistic health, whereby the urban-poor community are susceptible to low HRQoL due to their high vulnerability. This study aimed to determine factors that predicted the HRQoL among the urban-poor school-aged children. **Methods and Study Design:** This is a cross-sectional study and a total of 408 primary school-aged children (male: 72.3%; female: 27.7%), with a mean age of 9.68 ± 1.48 years, were recruited from 10 urban-poor flats through cluster sampling at the central region of Malaysia. Their anthropometry, nutrition knowledge, attitude and practice, physical activity, dietary practices, and HRQoL were assessed. **Results:** A quarter (24.5%) of the urban-poor children were either overweight or obese in the present study. The HRQoL total score among the urban-poor children was 65.0±18.5. The result of multiple linear regression analysis shown that higher nutrition attitude (B=0.34, p=0.001) and practices (B=0.39, p=0.001), higher physical activity (B=3.73, p=0.004), higher lunch intake (B=1.35, p<0.001), lower supper intake (B=-1.35, p<0.001), and lower fast-food intake (B=-1.61, -1.17, p<0.001) are the significant predictors of better HRQoL among the urban-poor children (R^2=0.32, F(8,399)=23.72, p<0.001). **Conclusions:** Future studies should focus on these predictors to formulate interventions that could enhance the HRQoL among the Malaysian urban-poor children.

Key Words: children, urban-poor, nutrition, physical activity, health-related quality of life

INTRODUCTION

Urbanization among the developing countries has led to nutrition transition where the population shifts from a diet with fruits, vegetables and animal protein to a diet predominantly high fat, sugar and processed foods, thus, resulting in the surging of obesity problems.[1] The process of urbanization leads to migration of low-income groups from rural to urban areas, inflow of foreign workers and raise of living cost; thus, resulting in a phenomenon called urban poverty.[2] The urban-poor community has a higher degree of commercialization, higher environmental and health risks, social disintegration and crime, which makes them more vulnerable than the rural poor due to limited accessibility to common resources.[3] The increasing burdens of unhealthy diets and insufficient physical activity among the urban-poor community due to obesogenic environment has led to the raise of overweight and obesity problems.[4] Poverty during childhood may also influence their growth and lead to adverse

health outcomes, impacting their physical and mental health later in their life.[5] In Malaysia, the prevalence of overweight and obesity can be as high as 23.0% among the urban-poor children, comparable to the other common malnutrition problems such as stunting (22.0%) and wasting (20.0%).[6]

Quality of life (QoL) is defined as "*individual's perception of their place in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns*",[7] whereby fulfilled expectations is an important aspect in understanding how an individual evaluate that they have good QoL.[8] On the other hand, the health-related quality of life (HRQoL) is a multidimensional concept which subjectively evaluates one's well-being from multiple dimensions such as physical, mental, social, as well as school or work performance.[9] In Malaysia, there is no nationwide study to provide an overview on the HRQoL among children. Based on previous local studies, the children from the Terengganu region of Malaysia have relatively good HRQoL while the obese children have significantly worse HRQoL.[10,11] As urban-poor children are a vulnerable group that are susceptible to health risk and mortality, it is important to determine the factors that could affect their HRQoL. Multiple studies have found that body weight status and lifestyle factors are associated with HRQoL among the children population.[12-14] In contrast, children who are more physically active were found to be associated with better HRQoL.[11,15,16] In addition, a previous systematic review showed that children who have healthier dietary behaviour and nutrient intake are associated with better mental health and HRQoL.[17,18] On the other hand, previous studies shown mix findings on how one's knowledge, attitude and practice (KAP) toward specific disease or condition could influence HRQoL.[19-22] However, to date, there is no study that investigates the influence of nutrition KAP on HRQoL among the children population. There is also limited study that investigates the factors that could impact the HRQoL among the urban-poor children.

In order to improve the HRQoL among the urban poor children, there is a need to investigate the lifestyle factors that could influence their HRQoL. The factors that are associated with HRQoL have not been widely studied among the urban-poor children population in developing countries such as Malaysia, which have one of the highest prevalence of overweight and obesity in the Southeast Asia region.[23] Therefore, the purpose of the present study was to investigate the factors that predicted the HRQoL among the urban-poor children population in Malaysia.

MATERIALS AND METHODS

Study design

The present study is a cross-sectional study that was conducted from the year of 2019 to 2020 before the pandemic of COVID-19. A total of 528 children were recruited from 10 selected low-income, which is the bottom 40% (B40) income, flat communities in the central region of Malaysia (Selangor, Negeri Sembilan) through cluster sampling. The B40 income group is defined as individuals with monthly household income at the bottom 40% among Malaysian population, which was below RM4850.[24] The *Projek Perumahan Rakyat* (PPR) is resident project for the lower-income group, usually high rise flat that is low cost and maintenance built on constraint land with limited green spaces.[25] Pre-test was conducted in B40 flat communities in Kuala Lumpur prior to actual data collection to test the understanding of children towards the questionnaires and the duration required. The data collection process was conducted in the common area of the flat communities. The inclusion criteria for the children were 1) Malaysian, 2) age 7 to 12 years old, and 3) comes from a B40 family, 4) do not have any physical and mental disabilities. After excluding the ineligible children (n=101) by referring to their household income and medical records, as well as incomplete assessment (n=19), a total of 408 children remained in the present study. All of the assessments were conducted by trained nutritionists, while all the self-administered questionnaires were completed by the children themselves, with the presence of trained nutritionists so that clarification could be provided when the children, especially the younger one, were in doubt.

The project protocol has been approved by the Ethical Committee for Research Involving Human Subjects Universiti Putra Malaysia (JKEUPM-2019-129). The permission required for data collection at the communities was obtained from the Malaysian Ministry of Education, State Department of Education of Selangor, State Department of Education of Negeri Sembilan, and local community organizations. In addition, signed informed consents were obtained from both the children and their parents prior to data collection.

Socio-demographic factors

The children were asked to fill in a set of self-administered questionnaire that asks about their sex, ethnicity, date of birth, and age.

Anthropometry

The children were measured by trained nutritionists for their height and weight using a SECA 213 stadiometer and InBody 270s body composition analyzer, respectively. Then, the required

information was key into the WHO Anthro Plus software to generate the BMI-for-age z-score of the children. The body weight status of the children was then determined based on the WHO Growth Reference 2007 for children aged 5 to 19 years.[26]

Nutrition knowledge, attitude, and practice (KAP)

The nutrition KAP of the children were determined by a self-administered KAP questionnaire adapted from the previous local study which measures the knowledge, attitude, and practice of the children towards healthy eating and physical activity.[27] The questionnaire used in the present study consists of 18 multiple-choice questions for knowledge, as well as 22 nutrition attitude items and 32 nutrition practice items measured through 5 points Likert scale. The nutrition knowledge has a minimum score of 0 and a maximum score of 18; the nutrition attitude section has a minimum score of 22 and maximum score of 110; and the nutrition practice has a minimum score of 32 and maximum score of 160. The total scores for nutrition KAP were then converted into percentage score with a maximum score of 100% for all three KAP sections. The internal consistency of the nutrition KAP questionnaire was acceptable with a Cronbach's alpha of 0.690, 0.671, and 0.629 for the nutrition knowledge, nutrition attitude, and nutrition practice, respectively.

Dietary practices

The dietary behaviours of the children were assessed by using Eating Behaviors Questionnaire (EBQ),[28] whereby the main meals, snacks intake, and fast-food intake of the previous 7 days were assessed in the present study. The classification of main meals and snacks in the present study were based on time-of-day definition whereby breakfast refers to the first meal of the day taken after wake up until 10.30am, lunch refers to the mid-day meal eaten around 12.30pm to 2.30pm, and dinner eaten around 6.00pm to 9.00pm.[29] Any eating occasions took place outside these time frames were categorized as snacking, such as morning tea eaten between 10.31am to 12.29pm, afternoon tea eaten between 2.31pm to 5.59pm, and supper eaten after 9.01pm.[30] The self-administered questionnaire was responded to on an 8-point frequency scale range from 0 days to 7 days a week. The children were determined as having meal-skipping behaviour when they skipped at least one main meals throughout the day.[31]

In addition, the dietary intake of the children was assessed by using one day 24-hour dietary recall. Previous study has found that one day 24-hour dietary recall is a valid and suitable instrument to be use among the children population. Multiple days food recalls on the

other hand is not applicable as young children can only report accurate food intake for the immediate past 24 hours without parental assistance.[32] The children were interviewed for the foods and beverages consumed for the past 24 hours, conducted by trained nutritionists with the assist of household measurement tools and food photographs from Food Atlas Malaysia.[33] The nutrition information (energy, macronutrient, and micronutrient) of their diet were analysed using the Nutritionist Pro TM software, with the food reference from Malaysian Food Composition Database and Energy and Nutrient Composition of Foods, Singapore.[34,35] Then, the energy and macronutrient intake of the children were compared to the Recommended Nutrient Intakes (RNI) for Malaysia.[36] Specifically, the daily recommended energy intake were 1750 kcal (7 to 9 years old) and 1930 kcal (10 to 12 years old) for male children, as well as 1610 kcal (7 to 9 years old) and 1710 kcal (10 to 12 years old) for female children. As for protein, the recommended intake for both male and female children aged 7 to 10 years old were 0.92 g/kg, as well as 0.90 g/kg and 0.89 g/kg for male and female children aged 11 to 12 years old, respectively. Last but not least, the recommended fat intake for male were 49–68 g/day (7 to 9 years old) and 54–75g/day (10 to 12 years old), as well as 45–63 g/kg (7 to 9 years old) and 48–67 g/kg (10 to 12 years old) for female children.

Physical activity

The Physical Activity Questionnaire for Older Children (PAQ-C) is a 7-day recall, 10-items self-administered questionnaire, which was used to assess the physical activity levels throughout the day.[37] The instrument is responded with a 5-point frequency scale with 1 being "no" and 5 being "7 times or more" for items 1 to 8, whereas item 9 was responded with a 5-point Likert's scale with 1 being "none" and 5 being "very often". The mean scores of all 9 items became the PAQ-C activity summary score whereby the higher the score, the higher the physical activity. The PAQ-C questionnaire shown acceptable internal consistency with a Cronbach's alpha of 0.620 in the present study.

Health-related quality of life (HRQoL)

The Pediatric Quality of Life Inventory 4.0 (PedsQL TM 4.0) is a self-administered questionnaire that was used to assess the HRQoL among the urban-poor children.38 The children were asked to answer a total of 23 items that assess their health-related problems in the past months, with 0 being never having a problem to 4 being always having a problem. The items are reversed scored and were transformed into a scale of 0 to 100 (with 0=100, 1=75, 2=50, 3=25, and 4=0). A higher mean score indicated a better HRQoL. The PedsQL

TM 4.0 also measured the four dimensions of HRQoL of children, which consist of physical, mental, social and school dimensions. The PedsQL TM 4.0 shown a very good internal consistency with a Cronbach's alpha of 0.893 in the present study.

Data analysis

Data analyses were conducted using the IBM SPSS version 25.0. Descriptive data for all the variables were presented as numbers and percentages for categorical data, as well as the mean and standard deviation for continuous data. Independent t-test was conducted to determine the differences among each of the factors between male and female children. Simple linear regression test was used to test the associations between each independent factor and HRQoL. Variables with $p<0.25$ in the simple linear regression tests were included in the multiple linear regression analysis to determine the factors associated with HRQoL. All the statistical significance levels are set as $p<0.05$.

RESULTS

The socio-demographic factors, nutrition KAP, and HRQoL of the children in the present study was shown as in Table 1. A majority of the children were males (72.3%), Malays (98.8%), and their mean age was 9.68±1.48 years. Males were significantly older than the female children in this study ($p=0.017$).

The mean body weight and height of the children were 132.4±10.2 cm and 31.2±11.1 kg, respectively. The mean BMI-for-age of the children was 0.014±1.73 and when classified using the WHO 2007 cut-off, 7.6% of the children were in the thinness/severe thinness category, 67.9% of the children had normal weight status, and almost a quarter of the children were either overweight (9.1%) or obese (15.4%). There was no sex difference in any of the anthropometry measurements ($p>0.05$).

The mean scores of the nutrition knowledge, attitude, and practice were 44.7±18.8, 72.6±8.3, and 65.0±7.4, respectively. Male children had significantly lower nutrition knowledge (43.3±19.1 vs 48.2±17.4) than their female counterpart ($p=0.020$). There was no significant difference in nutrition attitude and practice between male and female children. The mean score for physical activity was 2.98 ± 0.60 and there was no significant difference between both sexes. In addition, dinner was the most frequent main meal consumed by the children (4.2±2.3 days/week) whereas afternoon tea was the most frequently consumed snack for them (3.7±2.2 days/week). There is no significant difference between the male and female children in the consumption of any of the specific meals or snacks. Majority of the children

(86.5%) are classified as meal-skippers and there is no significant difference between the meal and female children.

As for the nutrient intake, the total energy intake of the children was 1676±418 kcal, whereby male children consumed significantly more energy than the female counterpart (p=0.001). As for the macronutrient energy distribution, the percentage of energy distribution from carbohydrate, protein, and fat among the urban-poor children are 50.7±8.3 %, 15.7±3.5 %, and 33.6±7.4 %, respectively. Majority of the children did not achieve RNI for energy intake (61.0%), but they achieved the RNI for protein intake (95.8%) and fat intake (37.5%). The male children also consumed significantly more carbohydrate (p=0.001) and protein (p=0.022) than the female children, while no significant difference was observed for fat intake. Last but not least, the mean score of HRQoL among the urban-poor children was 65.04±18.47%. No significant difference was observed between the male and female children for the HRQoL total score and all the dimensions, except for the social dimension where female children have better social scores than male children (p=0.024).

The factors that associated with HRQoL among the urban-poor children was displayed as in Table 2. In simple linear regression analyses, nutrition knowledge (B=0.24, 95% CI: 0.14, 0.33, p<0.001), nutrition attitude (B=0.54, 95% CI: 0.32, 0.75, p<0.001), nutrition practice (B=0.71, 95% CI: 0.47, 0.94, p<0.001), physical activity (B=4.79, 95% CI: 1.80, 7.77, p=0.002), and lunch intake (B=1.56, 95% CI: 0.78, 2.34, p<0.001) were significantly associated with higher HRQoL total score. In contrast, supper intake (B=-2.32, 95% CI: -3.06, -1.58, p<0.001), meal-skipping behaviour (B=-11.51, 95% CI: -16.66, -6.37, p<0.001), fast-food intake (B=-2.13, 95% CI: -2.58, -1.67, p<0.001) were significantly associated with lower HRQoL total score.

A total of 13 variables with p<0.25 (Table 2), including age, sex, nutrition knowledge, nutrition attitude, nutrition practice, physical activity, breakfast intake, lunch intake, morning tea, supper, meal-skipping behaviour, fast-food intake, and carbohydrate intake, were included in the multiple linear regression analysis. After controlling for age and sex, a significant regression model was found (F (8, 399)=23.72, p<0.001), with an R^2=0.32. The findings from multiple linear regression showed that nutrition attitude (B=0.34, 95% CI: 0.14, 0.53, p=0.001), nutrition practice (B=0.39, 95% CI: 0.17, 0.61, p=0.001), physical activity (B=3.73, 95% CI: 1.17, 6.29, p=0.004), and lunch intake (B=1.35, 95% CI: 0.67, 2.02, p<0.001) significantly predicted better HRQoL as shown in Table 3. On the other hands, supper intake (B=-1.35, 95% CI: -2.04, -0.66, p<0.001) and fast-food intake (B=-1.61, 95% CI: -2.04, -1.17, p<0.001) significantly predicted poorer HRQoL.

DISCUSSION

In the present study, we aimed to determine the predictors of HRQoL among the urban-poor children living in Malaysia. According to the basic principle of the KAP model, improvement in knowledge will influence the attitude and practice to reduce the human and economic burdens of diseases.[39] As HRQoL is a subjective and perception of physical and mental health,[9] people who are in a better state of health may have better perception of HRQoL.[21] However, the findings of the study was inconsistent with previous studies which found all three KAP had significant association with HRQoL,[19,21] whereas the present study only found this finding during the simple linear regression analysis but not in the multiple linear regression analysis. One of the possible reasons is that the nutrition knowledge among the urban-poor children were generally low in the present study; thus, it has lesser influence on HRQoL as compared to the other predictors in the model. The urban-poor environment such as parent's low education level and the limited access to quality schooling could be the reason of poor nutrition knowledge among the urban-poor children.[40] However, this could not be confirmed as the present study did not investigate on the parental and environmental factors.

In addition, eating behaviours such as more frequent lunch intake was significantly associated with better HRQoL, whereas higher supper intake and fast-food intake were significantly associated with poorer HRQoL in the present study. The previous study has reported that students who have more frequent lunch intake, which could reflect on more regular eating patterns, are significantly better in the physical and mental domains of HRQoL.[41] On the other hand, frequent supper intake of the children could be due to the influence of parents. Previous systematic review has found that parental feeding played an important role in shaping children's dietary behaviours, whereby restrictive feeding and snack accessibility were associated with increase in children's snack intake.[42] The restriction of parents may cause children to have disinhibited eating habits, increase interest in high-calories food and frequent snack intake; thus, lead to physical and mental health issue and finally affect their HRQoL.[42,43] In addition, frequent fast-food intake is a type of unhealthy dietary behaviour which was related to poor physical, mental and psychosocial health among the children population.[17,44] One of the driving forces could be due to the lack of accessible affordable healthy food choice while there are plentiful fast-food outlets around the urban poor environment.[45] The low-price high value offering by fast-food firms was appealing to the economically disadvantaged group which may lead to the increased prevalence of childhood obesity which will then influence their HRQoL.[46]

Our results also found that physical activity was significantly associated with HRQoL, which was consistent with previous studies.[11,15,16] Previous systematic review also confirmed that physical activity had significantly impacts on multiple physical, mental and psychosocial domains of HRQoL, regardless of sex, age, body weight status, and socioeconomic status.[47] However, it is worth noticing that the present study relied on subjective measures of physical activity, whereby the children might over-report their participation level in physical activity.[48] This is also supported by a previous study which reported that participants who are considered as physically active through objective measure have marginally higher HRQoL than those considered physically active via self-report.[49]

In the present study, significant differences were observed between urban-poor male and female children in nutrition knowledge, dietary intake and social domain of HRQoL. Contradict with previous study, the female children have significantly higher nutrition's knowledge in the present study.[50] This could be due to female children generally performed better academically as they are more engaged and experienced less burnout compared to male children at similar age.[51] On the other hand, male children have significantly high energy, carbohydrate and protein intake than female children. The sex differences in energy, carbohydrate, and protein intake were consistent with previous study as it could be due to male children tend to preferred high-energy-dense foods compare to female children.[52] Lastly, female children have significant higher score in social domain of HRQoL. This finding is consistent with previous study where female children were found to have better speech, language, and communication development; thus, resulted in better social development when compared to male children.[53]

The present study also found no significant association between BMI-for-age and HRQoL among the urban-poor children. This contradicted previous studies which reported BMI having significant association with HRQoL among the children population.[8,9,12] One of the possible reasons that lead to this finding might be due to the shift of perceived normal body shape and increasing acceptance towards adiposity among children.[54] This led to a phenomenon where children being obese is perceived as a norm when their day-to-day functioning is not negatively affected and do not make them stand out from their peers.[55] Therefore, the obese children could perceived themselves as having acceptable or even good HRQoL similar to those children who are non-obese.

The present study has several limitations that should be acknowledged. First, this is a cross-sectional study which could not examine causal relationships. In addition, the present study focused on urban-poor child population in the central region of Malaysia, whereby the data

could not be generalised to the whole Malaysian children population. Despite the instruments used in the present study had been validated and shown good reliability, the use of self-reported questionnaires might still be prone to measurement error and recall bias. Lastly, parental factors, which could be an important confounding variable, were not studied in the present study. Studies have reported that parents do play an important factor in determining the dietary behaviours and the health of their children.[56,57] Therefore, future studies should investigate the influence of parental factors to the HRQoL among the urban-poor children population.

Conclusion

The present study suggests that higher nutrition attitude and practice, physical activity and lunch intake were associated with better HRQoL among the children living in urban-poor areas, while older age, as well as higher supper and fast-food intake were associated with poorer HRQoL. As the HRQoL among the urban-poor children were not optimal, parents, stakeholders, and policy makers should have joint effort to tackle this issue among the urban-poor children. Future studies should focus on the predictors in the present study to formulate effective interventions that could enhance the health-related quality of life among the urban-poor children.

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CONFLICT OF INTEREST AND FUNDING DISCLOSURE

The authors declare no conflict of interest.

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REFERENCES

1. Popkin BM. Nutritional patterns and transitions. Popul Dev Rev. 1993;19:138-57. doi: 10.2307/2938388
2. Zainal NR, Kaur G, Ahmad NA, Khalili, JM. Housing conditions and quality of life of the urban poor in Malaysia. Procedia Soc Behav Sci. 2012; 50:827-38. doi: 10.1016/j.sbspro.2012.08.085
3. Wattent E. Conceptualization of urban poverty. Environ Urban. 1995;7:11-33. doi: 10.1177/095624789500700118

4. Popkin BM, Adair LS, Ng SW. Global nutrition transition and the pandemic of obesity in developing countries. Nutr Rev. 2012;70:3-21. doi: 10.1111/j.1753-4887.2011.00456.x
5. Shonkoff JP, Garner AS, Committee on Psychosocial Aspects of Child and Family Health, Committee on Early Childhood, Adoption, and Dependent Care, and Section on Developmental and Behavioral Pediatrics, Siegel BS, Dobbins MI, Earls MF et al. The lifelong effects of early childhood adversity and toxic stress. Pediatrics. 2012;129:232-46. doi: 10.1542/peds.2011-2663
6. United Nations Children's Fund (UNICEF). Children without: a study of urban child poverty and deprivation in low-cost flats in Kuala Lumpur. 2018 [cited 2022/07/28]; Available from: https://www.unicef.org/malaysia/FINAL-REPORT-1.pdf
7. World Health Organization Quality Of Life (WHOQOL) Group. Development of the WHOQOL: rationale and current status. Intl J Ment Health. 1994;23:24-56. doi: 10.1080/00207411.1994.11449286
8. Skevington SM, McCrate FM. Expecting a good quality of life in health: assessing people with diverse diseases and conditions using the WHOQOL‐BREF. Health Expect. 2012;15:49-62. doi: 10.1111/j.1369-7625.2010.00650.x
9. Petracci E, Cavrini G. The effect of weight status, lifestyle, and body image perception on health-related quality of life in children: a quantile approach. Qual Life Res. 2013;22:2607-15. doi: 10.1007/s11136-013-0358-0
10. Aziz NN, Wafa SWWSST, Halib H, Rahim M, Shahril MR. Child-report and parent-report of health-related quality of life among 9-11 years old obese school children in Terengganu, Malaysia. Malays J Public Health Med. 2017;2:20-31.
11. Wafa SWWSST, Shahril MR, Ahmad A, Zainuddin LR, Ismail KF, Aung MMT, Yusoff M. Association between physical activity and health-related quality of life in children: a cross-sectional study. Health Qual Life Outcomes. 2016;14:1-6. doi: 10.1186/s12955-016-0474-y
12. Ul-Haq Z, Mackay DF, Fenwick E, Pell JP. Meta-analysis of the association between body mass index and health-related quality of life among children and adolescents, assessed using the pediatric quality of life inventory index. J Pediatr. 2013;162:280-6. doi: 10.1016/j.jpeds.2012.07.049
13. Lee PY, Cheah WL, Chang CT. Childhood obesity, self-esteem and health-related quality of life among urban primary schools children in Kuching, Sarawak, Malaysia. Malays J Nutr. 2012;18:207-19.
14. Schwimmer JB, Burwinkle TM, Varni JW. Health-related quality of life of severely obese children and adolescents. JAMA. 2013;289:1813-9. doi: 10.1001/jama.289.14.1813
15. Kamolthip R, Fung XC, Lin CY, Latner JD, O'Brien KS. Relationships among physical activity, health-related quality of life, and weight stigma in children in Hong Kong. Am J Health Behav. 2021;45:828-42. doi: 10.5993/AJHB.45.5.3
16. Shoesmith A, Hall A, Hope K, Sutherland R, Hodder RK, Trost, SG et al. Associations between in-school-hours physical activity and child health-related quality of life: a cross-sectional study in a sample of Australian primary school children. Prev Med Rep. 2020;20:101179. doi: 10.1016/j.pmedr.2020.101179

17. Wu XY, Zhuang LH, Li W, Guo HW, Zhang JH, Zhao YK et al. The influence of diet quality and dietary behavior on health-related quality of life in the general population of children and adolescents: a systematic review and meta-analysis. Qual Life Res. 2019;28:1989-2015. doi: 10.1007/s11136-019-02162-4
18. Khalid S, Williams CM, Reynolds SA. Is there an association between diet and depression in children and adolescents? A systematic review. Br J Nutr. 2016;116:2097-2108. doi: 10.1017/S0007114516004359
19. Qiao H, Wang X, Qin Z, Wang N, Zhang N, Xu F. The relationship between health literacy and health-related quality of life among school-aged children in regional China. Health Qual Life Outcomes. 2021;19:1-8. doi: 10.1186/s12955-021-01895-6
20. Ahmad HS, Hashim R, Mohamed AL, Hoo YY. Knowledge, attitude, self-care practice and health related quality of life (HRQOL) among heart failure patients in a Malaysian tertiary hospital. Am J Pharmacol Sci. 2019;7:18-24. doi: 10.12691/ajps-7-1-4
21. Al-Aboudi IS, Hassali MA, Shafie AA. Knowledge, attitudes, and quality of life of type 2 diabetes patients in Riyadh, Saudi Arabia. J Pharm Bioallied Sci. 2016;8:195-202. doi: 10.4103/0975-7406.171683
22. Karbalaeifar R, Kazempour-Ardebili S, Amiri P, Ghannadi S, Tahmasebinejad Z, Amouzegar A. Evaluating the effect of knowledge, attitude and practice on self-management in patients with type 2 diabetes. Acta Diabetol. 2016;53:1015-23. doi: 10.1007/s00592-016-0905-6
23. World Health Organization (WHO). Global health observatory data: overweight and obesity. 2017 [cited 2022/09/14]; Available from: https://apps.who.int/gho/data/node.main.A896?lang=en
24. Department of Statistics Malaysia. Household income and basic amenities survey report. 2020 [cited 2022/09/13]; Available from: https://www.dosm.gov.my/v1/uploads/files/1_Articles_By_Themes/Prices/HIES/HIS-Report/HIS-Malaysia-.pdf
25. Aziz AA, Ahmad AS. Low cost flats outdoor space as children social environment. Procedia Soc Behav Sci. 2012;38:243-52. doi: 10.1016/j.sbspro.2012.03.346
26. World Health Organization (WHO). Growth reference 5–19 years. 2007 [cited 2022/07/28]; Available from: https://www.who.int/growthref/who2007_bmi_for_age/en/
27. Hiew CC, Chin YS, Chan YM, Mohd Nasir MT. Development and validation of knowledge, attitude and practice on healthy lifestyle questionnaire (KAP-HLQ) for Malaysian adolescents. J Nutr Health Sci. 2015;2:407. doi: 10.15744/2393-9060.2.407
28. Chin YS, Mohd Nasir MT. Eating behaviors among female adolescents in Kuantan district, Pahang, Malaysia. Pak J Nutr. 2009;8:425-32. doi: 10.3923/pjn.2009.425.432
29. Wan Abdul Manan WM, Nur Firdaus I, Safiah MY, Siti Haslinda MD, Poh BK, Norimah AK et al. Meal patterns of malaysian adults: findings from the Malaysian adults nutrition survey (MANS). Malays J Nutr. 2012;18:221-30.

30. Kerr MA, Rennie KL, McCaffrey TA, Wallace JM, Hannon-Fletcher MP, Livingstone MB. Snacking patterns among adolescents: a comparison of type, frequency and portion size between Britain in 1997 and Northern Ireland in 2005. Br J Nutr. 2008;101:122-31.
31. Dubois L, Girard M, Kent MP, Farmer A, Tatune-Tokuda F. Breakfast skipping is associated with differences in meal patterns, macronutrient intakes and overweight among pre-school children. Public Health Nutr. 2009;12:19-28
32. Livingstone MBE, Robson PJ. Measurement of dietary intake in children. Proc Nutr Soc. 2000;59:279-93.
33. Shahar S, Safii NS, Manaf ZA, Haron H. Atlas of food exchanges & portion sizes: third edition. Kuala Lumpuer, Malaysia: MDC Publishers Sdn Bhd; 2015.
34. Tee ES, Noor MI, Azudin MN, Idris KL. Nutrient composition of Malaysian foods. 4th edition. Kuala Lumpur, Malaysia: Institute for Medical Research; 1997.
35. Health Promotion Board. Energy and nutrient composition of food. 2011 [cited 2022/07/28]; Available from: https://focos.hpb.gov.sg/eservices/ENCF/.
36. National Coordinating Committee on Food and Nutrition. Recommended nutrient intakes for Malaysia. Kuala Lumpur, Malaysia: Ministry of Health; 2017.
37. Crocker PR, Bailey DA, Faulkner RA, Kowalski KC, McGrath R. Measuring general levels of physical activity: preliminary evidence for the physical activity questionnaire for older children. Med Sci Sports Exerc. 1997;29:1344-9. doi: 10.1097/00005768-199710000-00011
38. Varni JW, Burwinkle TM, Seid M. The PedsQLTM 4.0 as a school population health measure: feasibility, reliability, and validity. Qual Life Res. 2006;15:203-15. doi: 10.1007/s11136-005-1388-z
39. Mascie-Taylor CGN, Karim R, Karim E, Akhtar S, Ahmed T, Montanari RM. The cost-effectiveness of health education in improving knowledge and awareness about intestinal parasites in rural Bangladesh. Econ Hum Biol. 2003;1:321-30. doi: 10.1016/j.ehb.2003.08.001
40. Silva-Laya M, D'Angelo N, García E, Zúñiga L, Fernández T. Urban poverty and education. A systematic review. Edu Research Rev. 2020;29:100280. doi: 10.1016/j.edurev.2019.05.002
41. Heidke P, Vandelanotte C, Irwin C, Williams S, Saluja S, Khalesi S. Associations between health‐related quality of life and health behaviors in Australian nursing students. Nurs Health Sci. 2021;23:477-89. doi: 10.1111/nhs.12832
42. Blaine RE, Kachurak A, Davison KK, Klabunde R, Fisher JO. Food parenting and child snacking: a systematic review. Int J Behav Nutr Phys Act. 2017;14;1-23. doi: 10.1186/s12966-017-0593-9
43. Saltzman JA, Liechty JM, Bost KK, Fiese BH. Parent binge eating and restrictive feeding practices: Indirect effects of parent's responses to child's negative emotion. Eat Behav. 2016;21:150-4. doi: 10.1016/j.eatbeh.2016.02.001
44. Chen G, Ratcliffe J, Olds T, Magarey A, Jones M, Leslie E. BMI, health behaviors, and quality of life in children and adolescents: a school-based study. Pediatrics. 2014;133:e868-74. doi: 10.1542/peds.2013-0622

45. Alkon AH, Block D, Moore K, Gillis C, DiNuccio N, Chavez N. Foodways of the urban poor. Geoforum. 2013;48:126-35. doi: 10.1016/j.geoforum.2013.04.021
46. Newman CL, Howlett E, Burton S. Implications of fast food restaurant concentration for preschool-aged childhood obesity. J Bus Res. 2014;67:1573-80. doi: 10.1016/j.jbusres.2013.10.004
47. Wu XY, Han LH, Zhang JH, Luo S, Hu JW, Sun K. The influence of physical activity, sedentary behavior on health-related quality of life among the general population of children and adolescents: a systematic review. PloS one. 2017;12:e0187668. doi: 10.1371/journal.pone.0187668
48. Beyler N, Nusser S, Fuller W, Gregory W. Relating self-report and accelerometer physical activity with application to NHANES 2003–2004. In: Proceedings of the Survey Research Methods Section (pp. 3282-8). Boston: American Statistical Association; 2008.
49. Anokye NK, Trueman P, Green C, Pavey TG, Taylor RS. Physical activity and health related quality of life. BMC Public health. 2012;12:1-8. doi: 10.1186/1471-2458-12-624
50. Wan Dali WPE, Jan Mohamed HJ, Yusoff H. Nutrition knowledge, attitude, and practices (NKAP) and health-related quality of life (HRQOL) status among overweight and obese children: an analysis of baseline data from the Interactive Multimedia-based Nutrition Education Package (IMNEP) study. Malays J Nutr. 2017;23:17-20.
51. Jelas ZM, Salleh A, Mahmud I, Azman N, Hamzah H, Hamid ZA et al. Gender disparity in school participation and achievement: the case in Malaysia. Procedia Soc Behav Sci. 2014;140:62-8. doi: 10.1016/j.sbspro.2014.04.387
52. Poh BK, Ng BK, Haslinda MD, Shanita SN, Wong JE, Budin SB et al. Nutritional status and dietary intakes of children aged 6 months to 12 years: findings of the Nutrition Survey of Malaysian Children (SEANUTS Malaysia). Br J Nutr. 2013;110:S21-35. doi: 10.1017/S0007114513002092
53. Adani S, Cepanec M. Sex differences in early communication development: behavioral and neurobiological indicators of more vulnerable communication system developments in boys. Croat Med J. 2019;60:141-9. doi: 10.3325/cmj.2019.60.141
54. Harmer M, Wootton S, Gilbert R, Anderson C. Association of nutritional status and health-related quality of life in children with chronic kidney disease. Qual Life Res. 2019;28:1565-73. doi: 10.1007/s11136-019-02104-0
55. Oldham M, Robinson E. Visual body size norms and the under‐detection of overweight and obesity. Obe Sci Pract. 2018;4:29-40. doi: 10.1002/osp4.143
56. Scaglioni S, Salvioni M, Galimberti C. Influence of parental attitudes in the development of children eating behaviour. Br J Nutr. 2008;99:S22-5. doi: 10.1017/S0007114508892471
57. Case A, Paxson C. Parental behavior and child health. Health Aff. 2002;21:164-78. doi: 10.1377/hlthaff.21.2.164.

Table 1. Comparison of socio-demographic factors, anthropometry factors, nutrition KAP, dietary factors and HRQoL between male and female, among the urban-poor children (N = 408)

Factors	n (%) / Mean±SD			*p*
	Total	Male (n=295)	Female (n=113)	
Age	9.68±1.48	9.79±1.46	9.40±1.50	0.017*
Ethnicity	-	-	-	-
Malay	403 (98.8)	291 (98.6)	112 (99.1)	
Chinese	1 (0.2)	1 (0.3)	0 (0.0)	
Indian	4 (1.0)	3 (1.0)	1 (0.9)	
Body weight (kg)	31.2±11.1	31.5±10.9	30.5±11.5	0.417
Height (cm)	132.4±10.2	132.8±9.9	131.4±11.0	0.207
Body mass index (kg/m^2)	17.2±4.3	17.3±4.3	17.2±4.3	0.918
BMI-for-age	0.014±1.73	0.04±1.78	-0.06±1.60	0.586
Severe thinness	5 (1.2)	4 (1.4)	1 (0.9)	
Thinness	26 (6.4)	21 (7.1)	5 (4.4)	
Normal	277 (67.9)	194 (65.8)	83 (75.5)	
Overweight	37 (9.1)	27 (9.1)	10 (8.8)	
Obesity	63 (15.4)	49 (16.6)	14 (12.4)	
Nutrition knowledge (%)	44.7±18.8	43.3±19.1	48.2±17.4	0.019*
Nutrition attitude (%)	72.6±8.3	72.2±8.3	73.7±7.9	0.089
Nutrition practice (%)	65.0±7.4	64.8±7.5	65.6±7.1	0.322
Physical activity	2.98±0.60	2.99±0.58	2.95±0.63	0.576
Main meals intake (days/week)	-	-	-	-
Breakfast	3.82±2.45	3.76±2.47	3.96±2.37	0.449
Lunch	4.02±2.27	4.07±2.27	3.90±2.25	0.511
Dinner	4.23±2.29	4.28±2.30	4.08±2.26	0.419
Snacks intake (days/week)	-	-	-	-
Morning tea	3.60±2.23	3.53±2.25	3.81±2.16	0.256
Afternoon tea	3.66±2.15	3.69±2.16	3.57±2.14	0.590
Supper	2.54±2.33	2.61±2.31	2.38±2.38	0.381
Meal-skipping behaviour	-	-	-	-
Meal-skipper	353 (86.5)	255 (86.4)	98 (86.7)	
Non-meal skipper	55 (13.5)	40 (13.6)	15 (13.3)	
Fast-food intake (days/week)	4.39±3.62	4.45±3.57	4.22±3.74	0.561
Energy intake (kcal)	1676±418	1720±424	1564±379	0.001**
Achieved RNI	159 (39.0)	108 (36.6)	51 (44.0)	
Did not achieve RNI	249 (61.0)	180 (63.4)	62 (54.9)	
Carbohydrate intake (g)	213.1±67.3	219.9±68.7	195.2±60.4	0.001**
Percentage of energy distribution	50.7±8.3	51.1±8.3	49.7±8.4	0.126
Protein intake (g)	65.5±21.4	67.0±22.0	61.5±19.4	0.022*
Percentage of energy distribution	15.7±3.5	15.6±3.4	15.8±3.6	0.652
Achieved RNI	391 (95.8)	12 (4.1)	5 (4.4)	
Did not achieve RNI	17 (4.2)	283 (95.9)	108 (95.6)	
Fat intake (g)	62.3±19.8	63.2±20.6	59.7±17.3	0.109
Percentage of energy distribution	33.6±7.4	33.3±7.6	34.5±6.8	0.128
Exceed RNI	139 (34.1)	93 (31.5)	46 (40.7)	
Achieved RNI	153 (37.5)	112 (38.0)	41 (36.3)	
Did not achieve RNI	116 (28.4)	90 (30.5)	26 (23.0)	
HRQoL total score (%)	65.0±18.5	64.1±18.6	67.6±17.9	0.085
Physical dimension	65.9±22.5	64.6±22.6	69.2±22.0	0.060
Emotional dimension	64.6±23.2	64.6±23.6	64.6±22.4	0.997
Social dimension	69.0±24.0	67.3±24.5	73.3±22.2	0.024*
School dimension	60.2±20.4	59.5±21.1	62.2±18.4	0.233

RNI: Recommended Nutrient Intake.
*Significant difference for t test at $p<0.05$.
**Significant difference for t test at $p<0.01$.

Table 2. Factors associated with HRQoL among the urban-poor children, using simple linear regression analysis (N = 408)

Factors	Unadjusted coefficient (B)	95% CI †	*p*
Age	-1.17	-2.38, 0.05	0.059
Sex			
Male	-3.52	-7.53, 0.49	0.085
Female (reference)	-	-	-
BMI-for-age			
Overweight and Obesity	-1.16	-5.34, 3.02	0.586
Non-overweight and obesity (reference)	-	-	-
Nutrition knowledge (%)	0.24	0.14, 0.33	<0.001***
Nutrition attitude (%)	0.54	0.32, 0.75	<0.001***
Nutrition practice (%)	0.707	0.47, 0.94	<0.001***
Physical activity	4.79	1.80, 7.77	0.002**
Main meals intake (days/week)	-	-	-
Breakfast	0.643	-0.092, 1.38	0.086
Lunch	1.58	0.78, 2.34	<0.001***
Dinner	-0.060	-0.85, 0.73	0.880
Snacks intake (days/week)	-	-	-
Morning tea	0.693	-0.11, 1.50	0.092
Afternoon tea	-0.160	-1.00, 0.69	0.707
Supper	-2.32	-3.06, -1.58	<0.001***
Meal-skipping behaviour	-11.513	-16.66, -6.37	<0.001***
Fast-food intake (days/week)	-2.13	-2.58, -1.67	<0.001***
Energy intake (kcal)	-0.001	-0.01, 0.00	0.578
Carbohydrate intake (g)	-0.017	-0.04, 0.01	0.219
Protein intake (g)	-0.029	-0.11, 0.06	0.496
Fat intake (g)	0.042	-0.05, 0.13	0.362

CI: confidence interval.
*p<0.05, **p<0.01, ***p<0.001.

Table 3. Factors predicting the HRQoL among the urban-poor children using multiple linear regression analysis (N = 408) †

Factors	B (SE) †	95% CI ‡	*p*
Intercept	21.41 (10.14)		
Nutrition attitude	0.34 (0.10)	0.14, 0.53	0.001**
Nutrition practice	0.39 (0.11)	0.17, 0.61	0.001**
Physical activity	3.73 (1.30)	1.17, 6.29	0.004**
Lunch intake	1.35 (0.34)	0.67, 2.02	<0.001***
Supper intake	-1.35 (0.35)	-2.04, -0.66	<0.001***
Fast-food intake	-1.61 (0.22)	-2.04, -1.17	<0.001***

CI: confidence interval coefficient (Standard Error); CI: confidence interval.
†Covariates were age and sex, variable selection method: stepwise, R^2=0.32, F (8, 399)=23.72, p<0.001, assumption for interaction term, multicollinearity, residuals normality, and homoscedasticity were met.
*p<0.05, **p<0.01, ***p<0.001.