

# High Risk Health Behavior among Malaysian Adolescents: A Comparison between Gender

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Received: April 6, 2020 Accepted: July 27, 2020 Online Published: September 23, 2020

doi:10.5539/gjhs.v12n11p152

URL: <https://doi.org/10.5539/gjhs.v12n11p152>

## Abstract

**Purpose:** The main objective was to study health risk behaviours, knowledge and perception amongst Malaysian adolescents aged between 13-17 years of age.

**Methods:** Modified version of Youth Behaviour Risk Factor Surveillance System (YBRFSS) was used in this nationwide cross-sectional study involving 5,000 students enrolled from 50 selected schools, by adopting multi-stage sampling with randomization of schools and classes from all states in Malaysia. Descriptive data for behaviours, knowledge and perception were also compared between genders.

**Results:** Overall, 72.6% and 21.1% adolescents were found to not perform adequate exercise or did not perform any exercise, respectively. Majority of them also (81.8%) spent time watching TV beyond one hour per day. Although overall compliance to meal timings showed better result for girls (89.2%) than boys (84.8%); non-compliance to breakfast timing was the most frequent (74.7%) compared to other meal timings. Signs of continuous sadness ranked highest (21.3%), followed by signs of depression (9.4%) and suicidal ideation (7.8%). Girls suffered worse than boys for signs of continuous sadness (25.4% vs. 16.2%) and suicidal ideation (10.4% vs. 4.5%). In terms of perception, only 50.1% responded favourably to managing their anger. Boys were more satisfied with their own body weight and body shapes compared with the girls (43.3% vs. 34.7%; 45.3% vs. 37.9%, respectively).

**Conclusion:** Although adolescents in Malaysia had good overall knowledge and perception on the healthy habits, they still practiced risky behaviours which may lead to early morbidity and mortality among adolescence.

**Keywords:** smoking, alcohol intake, drug use, sexual behaviour, physical exercise

## 1. Introduction

The Malaysian health care authorities initiated a survey to determine the youth risky behaviour practices. In this regard, the Youth Behaviour Risk Factor Surveillance (YBRFS) was adapted from the Youth Behaviour Risk Factor Surveillance System (YBRFSS) originated by Centre for Disease Control (CDC) Atlanta in 1990. Since then, CDC has collected data on the behaviour trend from over 1.7 million high-school students (CDC, 2019). In the Malaysian version, knowledge and perception was added to the original YBRFSS.

To date, many surveys have been conducted on specific subgroups. The majority were for adults such as the Latino Health Behaviour Risk Factor Study (Godin et al., 2007; Finbalt Health Monitor, 2008; Cindi Health Monitor, 2001). Concerning adolescence, majority of the studies were the YBRFSS in the United States and the Global school-based Student Health Survey (GSHS) (CDC-2, 2012) conducted by the World Health Organization (WHO).

The present study was designed to address the urgent need of adolescent health behaviour data in southeast Asian region especially Malaysia. The closest available data hails from the 10-year National Health Morbidity Survey (NHMS) that provided the most recent data on adolescent in 2006. However, not all data on adolescent were

obtained as the NHMS main coverage is for adults aged 18 and above (Institute of Public Health, 2008). The GSHS covers ten key areas and is performed annually worldwide by presently in 101 nations. However, Malaysia was not part of the group, and both studies (NHMS and GSHS) did not include data on the knowledge and perception of participants involved.

The objective of this study was to elicit health risk behaviours, knowledge and perception amongst adolescence aged 13-17 years that leads to morbidity and mortality, disability and social problems traversing from adolescent to adult life. This study specially emphasised on exercise and physical inactivity, dietary behaviours, smoking behaviour, alcohol intake, drug use, risky sexual behaviour, mental health and road safety. It is expected that the results of the study may be beneficial for future health care planning in the country.

## **2. Methodology**

### *2.1 Study Design and Sampling*

This cross sectional study with multi-staged sampling involved Malaysian secondary school students from Form 1, 2 and 4 (equivalent to 7th, 8th and 10th grade of the American education system) aged between 13 to 17 years from selected secondary schools nationwide. Nationwide enrolment of the 2,248 public secondary schools in 2010 was 2,344,891 students for all 15 states in Malaysia (MOE, 2010). Therefore, fifty schools were selected via randomization according to the enrolment size and the representativeness of the population ratio and density for each state within the country. Overall, 5000 respondents were recruited; excluding absentees, illiterate adolescents and adolescents who refused to participate. All data collection was carried out between August and December 2010.

### *2.2 Ethical Approval*

Consent to conduct the study was obtained from two governing bodies; namely, The National Medical Research Ethics Committee of the Ministry of Health (Project Code: NMRR-09-97-3520) and the Education Research Ethics Division from the Ministry of Education. Written approval was also obtained from the State Health Directors, State Education Directors and the selected schools.

### *2.3 Instrument*

The Youth Behaviour Risk Factor Surveillance (YBRFS) questionnaire was adapted from the Youth Behaviour Risk Factor Surveillance System (YBRFSS) originated by Centre for Disease Control (CDC) Atlanta in 1990; and was modified by adding components of knowledge and perception adjusted to the needs of the local setting. The questionnaire was subjected to a series of review via workshops conducted between 2008–2010 involving experts from the various divisions within the Ministry of Health Malaysia and universities. The adapted questionnaire was also subjected to forward-backward translation.

The questionnaire comprises of three main components: (1) behaviour (exercise and inadequate physical inactivity, dietary behaviours, smoking behaviour, alcohol intake, drug use, risky sexual behaviour, mental health and road safety), (2) knowledge (exercise, food pyramid and dietary behaviour, smoking, alcohol, mental health & risky sexual behaviour), and (3) perception (exercise and physical inactivity, dietary behaviour, self-body perception, smoking behaviour, alcohol intake, risky sexual behaviour and mental health that covered two sub-domains; anger management and self-harm). The definitions used for the YBRFS were mostly derived from the original YBRFSS and other sources. They included definitions for exercise (ACSM, 1998), physical inactivity (The Henry J. Kaiser Foundation, 2005), meal timing (Gibney et al., 2005), favourable and unfavourable food intake (Ministry of Health, 2010), Body Mass Index (BMI) for age (WHO, 2007), smoking behaviour, alcohol intake, drug use, mental health and risky sexual behaviour (CDC, 2003).

Cognitive test was conducted involving 24 students from two different schools in Selangor, Malaysia via face-to-face interview and changes were made in the instrument prior to being pilot tested twice on different students in a high-school in Selangor. Subsequent changes were made accordingly to the piloted instrument before data collection. Data collected from the pre-test was analysed to measure the reliability and readability of the instrument. Results were tabulated and appraised to assess individual merits and usability. Some questions were modified to improve comprehension and readability while others were dropped as advised by the technical committee. Composite reliability was assessed for the attitude component and this yielded acceptable results for each domain: exercise and physical inactivity (0.571), dietary behaviour (0.570), self-body perception (0.826), smoking behaviour (0.652), alcohol intake (0.712), risky sexual behaviour (0.697), anger management sub-domain for mental health (0.623) and self-harm sub-domain for mental health (0.736).

## 2.4 Statistical Analysis

Complex sampling analysis extracted descriptive results with 95% Confidence Intervals (CI). Comparison was made between genders and missing values were not excluded from the analysis. Analysis was done using SPSS version 19.

## 3. Results

### 3.1 General Findings & Demographics

Overall response rate for the study was 4088 (81.8%) from the 5000 eligible respondents. The socio-demographic characteristics of the respondents (as shown in Table 1) represented the total student population in the country. Half of the respondents had 4 to 6 siblings in their family (50.1%) and the majority had 6 to 10 persons living together (53.4%). Most respondents also had parents who were married (88.8%).

Table 1. Socio-demographic Characteristics of Respondents

Characteristics		Total Respondent n (%)
State Zone	South	661 (14.5)
	Central	1203 (32.3)
	East Coast	767 (19.5)
	North	743 (17.5)
	Sarawak	266 (5.8)
	Sabah	448 (10.4)
School Type	Urban	1993 (51.9)
	Rural	2095 (48.1)
Sex	Male	1811 (45)
	Female	2267 (55)
Form	1 (13 years old)	1430 (35.0)
	2 (14 & 15 years old)	1391 (34.0)
	4 (16 & 17 years old)	1267 (30.0)
Race	Malay	2582 (66.2)
	Chinese	773 (16.9)
	Indian	200 (5.3)
	Other Bumis*	444(10.4)
	Natives**	10 (0.3)
	Others	39 (1.1)
Religion	Islam	2810 (71.3)
	Buddhist	665 (14.6)
	Christianity	406 (9.2)
	Hinduism	174 (4.6)
	Atheist	5 (0.1)
	Others	7 (0.2)
Age( in years)	13	1392 (34.5)
	14	1381 (34.0)
	Mean: 14.27	186 (3.9)
	Median: 14	1079 (26.5)
	17	50 (1.2)

	≤3	1442 (35.0)
<b>No. of siblings</b>	4 – 6	2000 (50.1)
	7 – 9	485 (12.3)
	10 – 12	114 (3.0)
	<hr/>	
<b>No. of persons living together</b>	≤ 5	1796 (43.7)
	6 – 10	2118 (53.4)
	11 – 15	111 (2.6)
<b>Parental marriage status</b>	Married	3611 (88.8)
	Divorced	159 (4.0)
	Loss of spouse	201 (5.2)
	Separated	37 (0.8)
	Do not know	53 (1.3)

Totals in table may not add up to 4088 or 100% due to missing or unclassified variables.

\* Residents in East Malaysia (Sabah and Sarawak).

\*\* Aborigines of the West Malaysia.

### 3.2 Behaviour

Half of the eight behavioural domains studied showed worrying trends. Smoking behaviour, alcohol intake, drug use and sexual behaviours showed a better overall result in practice as compared to the physical exercise and sedentary habits, dietary behaviours, mental health and road safety (Table 2). Exercise in particular showed the worst results among the favourable behaviours from the Exercise and Sedentary behaviour domain with only 6.0% reported of practicing adequate exercise. Although boys (10.1%) fared better compared to the girls (2.7%) in terms of exercise; both genders showed no difference in sedentary behaviours with excessive TV watching of beyond 1 hour (81.8%) and excessive video game playing (48.8%).

Within the dietary behaviour domain, the overall non-adherence to meal timing was 87.3%; with breakfast being the most frequently missed meal (74.7%), followed by lunch (57.8%) and dinner (47.5%). Girls showed better adherence to the meal timing as compared to the boys. Late night eating was least frequently reported attribute at 34.3% with no notable gender differences. Non-adherence to the recommended food groups was highest for vegetables (67.1%) and fruits (50.9%) with the girls showing higher non-adherence compared to boys. For risky dietary intake, over half of the respondents declared that they practiced regular intake of fast-food from fast food restaurants (69.0%) and school canteens (57.0%) as well as carbonated drinks (75.2%) beyond the recommended limit. In terms of BMI, most respondents were within the normal range (69.4%) with only 16.9% being overweight and 4.9% being obese.

Smoking behaviour, alcohol intake and drug use domain revealed low proportions of ever and current practices of risky behaviours. Smoking behaviour was the most frequently reported behaviour with 9.1% being ever smokers and 8.7% being current smokers. Boys were more frequently reported as ever smokers (17.6%) and current smokers (14.6%) compared with the girls (ever, 3.9% and current, 2.0%). This was followed by alcohol intake, with 5.7% having ever consumed alcohol and 5.6% still consuming alcohol. Only 0.1% of the respondents admitted to drug use (current drug user) and 0.7% admitted of ever inhaling glue. For both the latter domains, gender difference was extremely spatial.

A total of 61 subjects (1.6%) admitted of past sexual experience. Out of these 61 subjects, 43 adolescents (81.3%) had a single partner. Amongst those who admitted of having had sex, 11.1% were homosexuals, 5.5% were bisexuals, while the remaining were heterosexuals. Proportion of homosexuals and bisexuals were almost equivalent in either sex.

The road safety domain also showed low proportion of favourable behaviours with only 26.2 % of the respondents reported of wearing seatbelts every time they got into a car or taxi while only 30.9% wore a helmet while riding a motorcycle. No gender differences were noted.

Within the mental health domain, a similar downward trend was seen with more adherence towards more destructive behaviour. Signs of continuous sadness ranked highest with 21.3% of the total population reporting it

in this study and the signs were more prevalent among girls (25.4%) rather than boys (16.2%). Signs of depression ranked second among the respondents with 9.4% reporting it with little difference between gender. Suicidal ideation followed closely to depression with 7.8% reporting it and the behaviour skewed more towards the girls (10.4%) compared to boys (4.5%).

Table 2. Health Behaviour with Gender Comparison

Behaviours	Overall		Male		Female	
	n (%)	95% CI	n (%)	95% CI	n (%)	95% CI
<b>Exercise and Sedentary Behaviour</b>						
No Exercise	851 (21.1)	(19.8, 22.4)	205 (12.1)	(10.6, 13.9)	646 (12.1)	(10.6, 13.9)
Inadequate Exercise	2971 (72.6)	(71.1, 74.0)	1419 (77.4)	(75.3, 79.4)	1552 (77.4)	(75.3, 79.4)
Adequate Exercise	240 (6.0)	(5.3, 6.8)	179 (10.1)	(8.7, 11.6)	61 (2.7)	(2.1, 3.4)
Excessive TV Watching	3314 (81.8)	(80.6, 83.0)	1494 (82.5)	(80.6, 84.3)	1820 (81.3)	(79.5, 82.9)
Excessive Video Game Playing	1988 (48.8)	(47.2, 50.4)	1026 (56.4)	(54.0, 58.8)	962 (42.6)	(40.4, 44.7)
<b>Dietary Behaviour</b>						
Main Meals not Taken on Time	3509(87.3)	(86.2, 88.3)	1513 (84.8)	(83.1, 86.5)	1996 (89.2)	(87.8, 90.5)
All Week Late Night Eating	367 (34.3)	(8.2, 10.1)	189 (10.5)	(9.1, 12.1)	178 (8.0)	(6.9, 9.3)
Non-adherence to Timing for:						
Breakfast	2999 (74.7)	(73.3, 76.1)	1291 (72.4)	(70.2, 74.5)	1708 (76.6)	(74.5, 78.4)
Lunch	2304 (57.8)	(56.2, 59.4)	973 (55.1)	(52.7, 57.6)	1331 (60.0)	(57.8, 62.1)
Dinner	1878 (47.5)	(45.9, 49.1)	735 (42.2)	(39.8, 44.6)	1143 (51.9)	(49.7, 54.0)
Non-adherence to Recommended						
Dietary Intake:						
Legumes	1650 (41.1)	(39.5, 42.7)	690 (39.1)	(36.7, 41.5)	960 (42.7)	(40.5, 44.8)
Milk & Milk Products	1579 (39.0)	(37.4, 40.6)	663 (37.4)	(35.1, 39.8)	916 (40.3)	(38.2, 42.5)
Vegetable	2724 (67.1)	(65.6, 68.6)	1148 (64.4)	(62.0, 66.7)	1576 (69.4)	(67.3, 71.3)
Fruits	2059 (50.9)	(49.3, 52.5)	877 (48.9)	(46.4, 51.3)	1182 (52.5)	(50.3, 54.7)
Plain Water	1886 (47.5)	(45.8, 49.1)	711 (40.7)	(38.3,43.2)	1175 (53.0)	(50.8, 55.1)
Risky Dietary Intake:						
Fast Food from Fast Food Restaurants	2786 (69.0)	(67.5, 70.5)	1247 (68.9)	(66.6, 71.1)	1539 (69.1)	(67.1, 71.1)
Fast Food from School Canteen	2339 (57.0)	(55.4, 58.6)	1081 (59.1)	(56.7, 61.5)	1258 (55.3)	(53.1, 57.4)
Carbonated Drinks	3023 (75.2)	(73.8, 76.5)	1438 (79.8)	(77.8, 81.7)	1585 (71.3)	(69.4, 73.2)
<b>Smoking Behaviour</b>						
Current Smoker	329 (8.7)	(7.8, 9.7)	248 (14.6)	(12.9, 16.4)	45 (2.0)	(1.5, 2.8)
Ever Smoker	353 (9.1)	(8.1, 10.1)	308 (17.6)	(12.9, 16.4)	81 (3.9)	(3.1, 4.9)
Non-Smoker	3389 (82.1)	(80.7, 83.3)	1252 (67.6)	(65.3, 69.9)	2137 (93.9)	(92.7, 94.9)
<b>Alcohol Intake</b>						
Current Drinker	256 (5.6)	(5.0, 6.4)	146 (6.0)	(5.0, 7.2)	110 (4.4)	(3.6, 5.3)
Ever Drinker	255 (5.7)	(5.0, 6.5)	117 (7.2)	(6.1, 8.5)	138 (5.5)	(4.6, 6.5)
Non-Drinker	3654 (88.7)	(87.6, 89.6)	1547 (86.8)	(85.1, 88.3)	2017 (90.2)	(88.9, 91.4)

<b>Drug Use</b>						
Current Drug user	6 (0.1)	(0.1, 0.3)	3 (0.1)	(0.0, 0.4)	3 (0.1)	(0.0, 0.4)
Ever Drug user	8 (0.1)	(0.1, 0.3)	8 (0.3)	(0.1, 0.6)	0 (0.0)	(0.0, 0.0)
Ever Inhaled Gum	26 (0.7)	(0.5, 1.0)	14 (0.8)	(0.5, 1.4)	5 (0.6)	(0.3, 1.0)
Non-Drug user	4027 (98.8)	(98.4, 99.1)	1780 (98.4)	(97.7, 98.9)	2247 (99.1)	(98.6, 99.4)
<b>Risky Sexual Behaviour</b>						
Had Sexual Experience	61 (1.6)	(1.2, 2.0)	33 (1.8)	(1.2, 2.5)	28 (1.4)	(0.9, 2.0)
<b>Sexual Preference*</b>						
Heterosexual	50 (80.4)	(66.9, 89.3)	26 (74.7)	(54.4, 88.0)	24 (86.4)	(67.0, 95.2)
Homosexual	6 (11.1)	(4.8, 23.6)	3 (11.1)	(3.6, 31.4)	3 (11.1)	(3.0, 13.6)
Bisexual	3 (5.5)	(1.7, 17.0)	1 (2.8)	(8.4, 18.2)	2 (5.9)	(1.9, 30.0)
<b>Sexual partners*</b>						
Single partner	43 (81.3)	(67.7, 90.0)	24 (84.4)	(64.0, 94.3)	19 (78.2)	(57.4, 90.5)
More than one partner	10 (18.7)	(10.0, 32.3)	4 (15.6)	(5.7, 36.0)	6 (21.8)	(9.5, 42.6)

Table 2 (cont'd). Health Behaviour with Gender Comparison

<b>Behaviours</b>	<b>Overall</b>		<b>Male</b>		<b>Female</b>	
	<b>n (%)</b>	<b>95% CI</b>	<b>n (%)</b>	<b>95% CI</b>	<b>n (%)</b>	<b>95% CI</b>
<b>Road Safety</b>						
Wear seatbelts in cars or taxi	1099 (26.2)	(24.8, 27.6)	541 (29.3)	(27.2, 31.6)	558 (23.6)	(21.8, 25.5)
Wear helmet while riding motorcycle	1229 (30.9)	(29.4, 32.5)	564 (32.3)	(30.1, 34.7)	665 (29.8)	(27.8, 31.8)
<b>Body Mass Index (BMI)**:</b>						
Underweight	310 (7.7)	(6.9, 8.6)	149 (8.1)	(6.9, 9.5)	161 (7.3)	(6.3, 8.6)
Normal	2837 (69.4)	(67.9, 70.9)	1268 (69.8)	(67.5, 72.0)	1569 (69.1)	(67.0, 71.1)
Overweight	673 (16.9)	(15.7, 18.2)	294 (16.8)	(15.0, 18.7)	379 (17.0)	(15.4, 18.7)
Obese	198 (4.9)	(4.3, 5.7)	83 (4.5)	(3.6, 5.7)	115 (5.2)	(4.3, 6.3)
<b>Mental Health**</b>						
Signs of Continuous Sadness	873 (21.3)	(20.0, 22.6)	290 (16.2)	(14.5, 18.1)	583 (25.4)	(23.6, 27.3)
Signs of Depression	386 (9.4)	(8.5, 10.4)	171 (9.4)	(8.1, 10.9)	215 (9.5)	(8.3, 10.8)
Suicidal Ideation	310 (7.8)	(6.9, 8.7)	83 (4.5)	(3.6, 5.6)	227 (10.4)	(9.2, 11.9)
Mentally Healthy	2465 (60.5)	(58.9, 62.1)	1241 (68.4)	(66.1, 70.7)	1224 (54.0)	(51.8, 56.1)

Totals in table may not add up to 4088 or 100% due to missing or unclassified variables.

\*for the 61 respondents who had sexual experience.

\*\* Non behavioural component.

### 3.3 Knowledge

The Knowledge component delved into six domains: exercise, food pyramid and dietary behaviour, smoking, alcohol, mental health & risky sexual behaviour knowledge (Table 3). The findings showed that the respondents had a good overall outlook in terms of knowledge. However, respondents scored low on the item 'to ensure the body gets enough nutrients, students need to eat three of six food groups recommended by the Malaysian Food Pyramid' with only 13.6% providing positive responses. Within the same domain of dietary behaviour knowledge, respondents also scored low on the correct 'servings of fruits to be consumed' (33.5%) and 'servings of vegetables to be consumed' (31.9%).

Respondents also scored low in the risky sexual health behaviour domain for questions asked such as ‘having sex with a 16-year old girl is illegal even though it is consensual’ (16.9%), ‘infection is caused by abortion’ (28.5%), ‘syphilis is one of the diseases caused by having multiple sexual partners’ (15.2%) and ‘sexual activities are one of the mode of transmission of HIV/AIDS’ (83.4%). Overall, comparison between gender showed that girls scored better for the majority of the questions.

Table 3. Knowledge on Healthy Behaviour with Gender Comparison

Knowledge on...	Overall		Male		Female	
	n (%)	95% CI	n (%)	95% CI	n (%)	95% CI
<b>Exercise</b>						
Warming up is to Prevent Injury	3346 (82.5)	(81.2, 83.6)	1504 (82.5)	(80.6, 84.3)	1842 (82.4)	(80.7, 83.9)
Exercise can Increase Metabolism	2710 (65.9)	(64.4, 67.5)	1215 (65.7)	(63.3, 68.0)	1495 (66.1)	(64.0, 68.1)
<b>Food Pyramid (groups 1 to 6)</b>						
Rice, Noodle, Bread, Cereals, Cereal Products & Tubers(1)	2502 (60.3)	(58.7, 61.9)	998 (54.1)	(51.7, 56.6)	1504 (65.4)	(63.3, 67.5)
Fruits(2)	2366 (57.6)	(56.0, 59.2)	978 (53.0)	(50.6, 55.5)	1388 (61.3)	(59.2, 63.4)
Vegetables(3)	2505 (60.4)	(58.8, 62.0)	1086 (58.7)	(56.3, 61.1)	1419 (61.8)	(59.6, 63.9)
Meat, Poultry, Eggs & Legumes(4)	2283 (55.6)	(54.0, 57.2)	955 (52.3)	(49.8, 54.7)	1328 (58.3)	(56.2, 60.4)
Milk & Milk Products (5)	2366 (57.3)	(55.7, 59.0)	972 (52.6)	(50.2, 55.0)	1394 (61.2)	(59.1, 63.3)
Fat, Oil, Sugar & Salts(6)	2752 (66.6)	(65.0, 68.1)	1053 (57.5)	(55.1, 59.9)	1699 (74.1)	(72.1, 75.9)
Overall Knowledge On Food Pyramid	2419 (59.9)	(58.3, 61.5)	1121 (62.4)	(60.0, 64.7)	1298 (57.9)	(55.8, 60.0)
<b>Dietary Behaviour</b>						
One Need To Eat All 6 Food Groups Recommended in Food Pyramid	568 (13.6)	(12.5, 14.7)	239 (12.6)	(11.1, 14.3)	329 (14.4)	(13.0, 16.0)
Carbonated Drink Is Not Encouraged Daily, one must consume...	3196 (78.3)	(76.9, 79.6)	1378 (75.9)	(73.7, 77.9)	1818 (80.2)	(78.5, 81.9)
1-3 Servings of Milk or Milk Products	3165 (77.0)	(75.6, 78.3)	1293 (70.7)	(68.4, 72.9)	1872 (82.2)	(80.4, 83.8)
At Least 8 Glasses Of Plain Water	2856 (69.6)	(68.1, 71.1)	1159 (63.2)	(60.8, 65.6)	1697 (74.8)	(72.8, 76.6)
2 Servings Of Fruit	1371 (33.5)	(31.9, 35.0)	558 (30.8)	(28.6, 33.1)	813 (35.6)	(33.6, 37.7)
3 Servings Of Vegetables	1314 (31.9)	(30.4, 33.4)	563 (30.9)	(28.7, 33.1)	751 (32.7)	(30.7, 34.8)
<b>Smoking</b>						
Smoking Causes Lung Cancer	3836 (94.2)	(93.4, 94.9)	1672 (92.3)	(90.9, 93.5)	2164 (95.7)	(94.8, 96.5)
Selling Cigarettes To Underage (≤18 Years) Is Illegal	3647 (89.7)	(88.6, 90.6)	1601 (88.3)	(86.6, 89.8)	2046 (90.8)	(89.5, 91.9)
<b>Alcohol</b>						
Alcohol Can Cause Liver Damage	2612 (63.0)	(61.4, 64.6)	1171 (63.7)	(61.3, 66.0)	1441 (62.5)	(60.3, 64.6)
Selling Alcohol To Underage (≤18 Years) Is Illegal	3285 (80.4)	(79.1, 81.7)	1439 (78.8)	(76.8, 80.8)	1846 (81.7)	(80.0, 83.3)
<b>Mental Health</b>						
Suicide Is Illegal	3291 (81.0)	(79.7, 82.2)	1444 (80.1)	(78.1, 82.0)	1847 (81.7)	(80.0, 83.3)
Methods Of Dealing With Stress:						
Relax And Listen To Music	2582 (63.2)	(61.6, 64.7)	1077 (58.4)	(56.0, 60.8)	1505 (67.1)	(65.0, 69.1)
Pray	2503 (62.5)	(61.0, 64.1)	1061 (59.6)	(57.1, 61.9)	1442 (65.0)	(62.9, 67.0)
Exercise	1748 (43.4)	(41.7, 45.0)	847 (46.6)	(44.2, 49.0)	901 (40.7)	(38.6, 42.9)
Talk To Someone	1683 (41.0)	(39.4, 42.6)	620 (33.9)	(31.7, 36.3)	1063 (46.8)	(44.6, 49.0)
Scream On Top Of Lung	1019 (25.1)	(23.7, 26.5)	380 (20.9)	(19.0, 23.0)	639 (28.4)	(26.5, 30.4)

Table 3 (cont'd). Knowledge on Healthy Behaviour with Gender Comparison

Knowledge on...	Overall		Male		Female	
	n (%)	95% CI	n (%)	95% CI	n (%)	95% CI
<b>Sexual Behaviour</b>						
Use Of Vulgar Words Is Sexual Harassment	2819 (69.5)	(68.0, 70.9)	1265 (69.9)	(67.6, 72.1)	1554 (69.1)	(67.1, 71.1)
Having Sex With a 16 Year Old Girl is Illegal Even Though Consensual	666 (16.9)	(15.7, 18.1)	293 (16.9)	(15.2, 18.9)	373 (16.8)	(15.2, 18.5)
Abstinence is the Best Method to Avoid Pregnancy	3489 (85.6)	(84.4, 86.7)	1446 (80.4)	(78.4, 82.2)	2043 (89.8)	(88.4, 91.1)
Complications Caused by Abortion:						
Infection	1171 (28.5)	(27.0, 30.0)	560(30.3)	(28.1,32.6)	611(27.0)	(25.1, 29.0)
Emotional Disturbance	2413(59.0)	(57.4, 60.6)	1014(56.0)	(53.6, 58.4)	1399(61.5)	(59.3, 63.6)
Death	1448(35.0)	(33.5, 36.6)	614(33.0)	(30.8, 35.3)	834(36.7)	(34.6, 38.8)
Difficulty In Future Pregnancy	2111(52.5)	(50.9, 54.1)	849(47.4)	(45.0, 49.9)	1261(56.6)	(54.5, 58.8)
Diseases caused by having multiple sexual partners						
HIV/AIDS	3773 (92.7)	(91.8, 93.5)	1633 (90.0)	(88.5, 91.4)	2140(94.9)	(93.8, 95.7)
Syphilis	632(15.2)	(14.1, 16.4)	297(16.6)	(14.8, 18.5)	335(14.1)	(12.7, 15.7)
HIV/AIDs can be transmitted by						
Blood Transfusion	1886 (46.4)	(44.8, 48.0)	716(40.3)	(37.9, 42.7)	1170(51.4)	(37.9, 42.7)
Sharing Of Needles	2966(73.8)	(72.3, 75.2)	1261(70.5)	(68.2, 72.7)	1705(76.4)	(74.5, 78.2)
Sexual Activities	3402(83.4)	(82.1, 84.6)	1432(79.1)	(77.0, 81.0)	1970(86.9)	(85.4, 88.3)

Totals in table may not add up to 4088 or 100% due to missing or unclassified variables.

### 3.4 Perception

The Perception component attempted to seek favourable perception from seven domains listed (Table 4). Of the seven domains, four domains (dietary intake, smoking behaviour, alcohol intake and risky sexual behaviour) showed favourable perception and the proportions in general for all items showed better results among girls. For the remaining domains, the respondents provided a mixture of responses with the mental health domain yielding both favourable and unfavourable responses within its two sub-domains.

Exercise and physical inactivity domain showed least favourable responses per item basis. Only 10.5% of the respondents perceived exercise as important to them, whilst 42.1% claiming to possess the energy to perform exercises and 49.0% mentioning that they will exercise even without friends. Albeit, over half of the subjects felt that time was not an issue (56.3%). In terms of gender, overall responses skewed towards girls over boys in terms of favourable responses.

The mental health domain yielded mixed findings. Only half of respondents perceived of having ability to control their anger well (50.1%) and girls seem to perceive less able to manage their anger compared to the boys (45.8% vs. 55.4%). Only less than half of respondents perceived average stress level is good and can be motivating (41.1%). Majority perceived that no one should commit suicide (80.3%) and self-inflicted injury should not be committed (75.9%).

For the self-body perception domain, respondents were unfavourable to both items; with only 38.6% reported of being satisfied with their current weight and only 41.2% were satisfied with their body shape. For both items, boys were more favourable in their responses.

Table 4. Perception on Health Behaviour with Gender Comparison

Perception Findings - Favourable	Overall		Male		Female	
	n (%)	95% CI	n (%)	95% CI	n (%)	95% CI
<b>Exercise &amp; Physical Inactivity</b>						
I Have Enough Energy To Do Exercise	1706 (42.1)	(40.5, 43.7)	682 (37.8)	(35.5, 40.2)	1018 (45.5)	(43.3, 47.7)
Exercise Is Important To Me	443 (10.5)	(9.6, 11.6)	181 (9.5)	(8.2, 11.1)	262 (11.4)	(10.1, 12.9)
I Will Exercise Even Without My Friends	2008 (49.0)	(47.4, 50.7)	805 (43.9)	(41.5, 46.3)	1197 (53.2)	(51.0, 55.3)
I Have No Problem Finding Time To Do Exercise	2307 (56.3)	(54.7, 57.9)	892 (48.6)	(46.1, 51.0)	1410 (62.7)	(60.6, 64.8)
<b>Dietary Intake</b>						
I Would Rather Eat Home Cooked Meals than Fast Food	2829 (69.1)	(67.5, 70.6)	1159 (63.9)	(61.5, 66.2)	1670 (73.4)	(71.4, 75.2)
I Like Eating Fruits	3670 (90.2)	(89.2, 91.2)	1589 (88.2)	(86.5, 89.6)	2082 (91.9)	(90.7, 93.0)
I Like Eating Vegetables	3100 (75.6)	(74.1, 77.0)	1363 (74.8)	(72.6, 76.9)	1737 (76.2)	(74.3, 78.0)
<b>Smoking Behaviour</b>						
Smoking Does Not Symbolizes Adulthood (Macho)	3134 (76.8)	(75.3, 78.1)	1250 (69.2)	(66.8, 71.4)	1884 (83.0)	(81.2, 84.6)
It Is Not True Student Who Smokes Have More Friends	3285 (80.0)	(78.6, 81.3)	1327 (73.1)	(70.9, 75.2)	1958 (85.6)	(83.9, 87.1)
It Is Not True Smoking Is Cool	2263 (54.8)	(53.2, 56.4)	927 (50.9)	(48.4, 53.3)	1336 (58.0)	(55.8, 60.1)
<b>Alcohol Intake</b>						
Drinking During Teenage Years Does Affect Health	3070 (75.1)	(73.7, 76.5)	1290 (71.1)	(68.9, 73.3)	1780 (78.4)	(76.6, 80.2)
It Is Not True Drinking Alcohol Can Calm The Mind	3326 (82.0)	(80.7, 83.2)	1415 (78.7)	(76.6, 80.6)	1911 (84.7)	(83.1, 86.2)
<b>Mental Health</b>						
I Can Control My Anger Well	2024 (50.1)	(48.5, 51.7)	999 (55.4)	(52.9, 57.8)	1025 (45.8)	(43.6, 47.9)
Average Stress Level Is Good And Can Be Motivating	1677 (41.1)	(39.5, 42.7)	738 (40.8)	(38.5, 43.3)	939 (41.2)	(39.1, 43.4)
Anger Should Not Be Bottled Up	2371 (58.3)	(56.7, 59.9)	973 (53.5)	(51.1, 55.9)	1398 (62.3)	(60.2, 64.4)
No One Should Commit Suicide	3257 (80.3)	(79.0, 81.5)	1409 (78.7)	(76.7, 80.6)	1848 (81.5)	(79.8, 83.2)
Self-Inflicted Injury Should Not Be Committed	3096 (75.9)	(74.5, 77.2)	1354 (74.6)	(72.4, 76.7)	1742 (77.0)	(75.1, 78.7)
<b>Sexual Behaviour</b>						
Virginity Should Be Protected Until Marriage	3315 (81.9)	(80.6, 83.1)	1375 (76.2)	(74.1, 78.2)	1940 (86.5)	(84.9, 87.9)
It Is Important My Partner Is Virgin Before Marriage	2869 (70.7)	(69.2, 72.1)	436 (65.9)	(63.5, 68.2)	327 (74.6)	(72.7, 76.4)
<b>Self-Body Perception</b>						
I Am Satisfied With My Current Weight	1568 (38.6)	(37.0, 40.2)	792 (43.3)	(40.9, 45.7)	776 (34.7)	(32.7, 36.8)
I Am Satisfied With My Body Shape	1667 (41.2)	(39.7, 42.9)	815 (45.3)	(42.9, 47.7)	852 (37.9)	(35.8, 40.1)

Totals in table may not add up to 4088 or 100% due to missing or unclassified variables.

#### 4. Discussion

The present study is consistent with reports from WHO that 60% of the world's population is not getting enough physical activity (WHO, 2003). This finding is reflective of the Malaysian Adult Nutrition Survey conducted in 2003 where only 15.6% of adults did adequate exercise (Ministry of Health, 2003). This study further reinforced high sedentary lifestyle of excessive TV watching (81.8%) as reported in Spanish adolescent. This association could explain the lack of time for exercise as more time is devoted to sedentary lifestyle among adolescents (Serrano-Sanchez et al., 2011). In previous years, school children performance had always been benchmarked through academic performance thus ignoring the physical education and health. However, of late the National Education Philosophy is reinforced through the 1Student 1Sport Policy to encourage students to take up in sports as an initiative to improve physical activity and education in schools (Ministry of Education, 2011). Although the respondents had fairly good knowledge on exercise, they lacked the physical willpower to do it. Having a negative perception on exercise only strengthens the poor behaviour performance. About half of the respondents preferred to do exercise with the company of friends and a significant minority of them had problem finding time to do exercise. This dependency on social support to do exercise is the nature of humans. Other studies also noted time constraints such as after-school time demand as the similar barriers to physical activities (Romero, 2005); or in this case of exercise.

High non-adherence to meals timing is alarming especially for the first meal (breakfast) at 74.7%; considering that breakfast skipping is associated with dietary behaviours that result in increased unhealthy weight gain from adolescence to adulthood (Niemeier et al., 2006). Many possible factors may have led respondents not taking breakfast during the recommended timing. Some possible reasons include no time for breakfast (Shaw, 1998), living far away from schools (Nicklas, O'Neil, & Berenson, 1998) and that breakfast could not be prepared at home due to parents rushing out to work in the morning (Jackson, 2013). Respondents tended to take their "breakfast" during the morning recess (between 9:40 am and 10:50 am depending on school timing) and this affects the timing for lunch and dinner by pushing these meals to a later time; de-balancing the overall meals timing for the day. Other reasons such as leaving school late or reaching home late due to the standard school time ending between 12:40pm and 1:10pm (depending on schools), also tends to shift the time for lunch further. Added with extracurricular activities, meal timing tends to change for the benefit of these activities. This may have contributed to the high overall meals timing non-adherence (87.3%), even though these adolescents had good knowledge and perception on other aspects of dietary behaviours. The break up for all components between genders seemed to favour more on the boys compared to girls as physiologically boys tend to eat more due to their on-going puberty that ceases near to adulthood compared to the girls in whom it terminates earlier (PAMF, 2001) and who has more consciousness regarding their body shape and weight (Shaw, 1998).

Within the same domain, non-adherence to recommended food types is problematic only for vegetables and fruits. The 67.1% for vegetables and 50.9% for fruits non-adherence is reflective of the Malaysian Adult Nutrition Survey which revealed that only 60.1% of adults are not consuming adequate amounts of vegetables (Ministry of Health-2, 2003). These results are concurrent with low knowledge scores of the respondents on serving size of fruits (33.5%) and vegetables (31.9%). It is common knowledge that children do not like vegetables and fruits but they are good sources of complex carbohydrates, vitamins, minerals and other substances important for good health. Dietary patterns that include higher intakes of fruits and vegetables were associated with several health benefits, including a decreased risk for some type of cancer (CDC, 2006). Thus, the practice of these beneficial food group intakes should be inculcated from young to prevent resistance in consumption. It should be noted however; the respondents have tenacity for taking fast food from either the fast-food restaurant (69.0%) or school canteen (57.0%). This in turn increases the chances of intake for carbonated drinks (75.2%). Studies showed a significant positive association between adolescent and their peer's behaviour in terms of sports, exercise and fast food consumption (Ali, Amialchuk, & Heiland, 2011). The accessibility of the fast food will lead to an increase in prevalence of obesity that is associated with hyperlipidaemia, raised blood pressure (hypertension), abnormal glucose tolerance, and adverse psychological and social consequences (Mohammadbeigi et al., 2019). Although the results of the Body Mass Index (BMI) suggested that the majority is normal, a 21.8% representativeness of the overweight and obesity cannot be overlooked. This linkage is often associated with intake of carbonated soft drink and fast food (Bleich & Vercammen, 2018).

The Smoking Behaviour domain showed contradicting results in regards to the behaviour, knowledge and perception components. Less than 10% declared to be ever smokers and 8.7% are still smoking and this is reflective of their knowledge of knowing smoking to be the cause of cancer (94.2%) and the illegality for selling cigarettes to minors (89.7%). The contradiction occurs in perception where the majority believed that smoking

symbolizes adulthood (76.8%) and by smoking will attain more friends (80.0%) which consistent with other study (Oidwai, Ishaque, Shah, & Rahim, 2010). The perception is more skewed towards girls than boys indicating the success of the marketing by tobacco companies to increase smoking in female. If the perception is not changed, the tendency of adolescent to start smoking will be high especially when the majority of smokers begin tobacco use before they reach adulthood (Cantrell et al., 2018).

Alcohol Intake domain yielded similar results to smoking behaviour in every sense. Although yielding lower prevalence of ever (5.7%) and current (5.6%) drinker and also slightly lower knowledge level, the perception component yielded almost similar values to smoking. The majority agreed that drinking during the teenage years does not affect health (75.1%) and intake of alcohol can calm the mind (82.0%). These misperceptions, if not changed can lead to a start of excessive intake at a younger age. Young people who drink are more likely to use tobacco and other drugs and engage in risky sexual behaviours, than those who do not drink (Calvert, Bucholz, & Steger-May, 2010) and study showed early initiation of smoking and alcohol drinking reduced bone mineral density in late adolescence (Lucas, Fraga, Ramos, & Baros, 2012). Recent studies have shown drug and substance use, availability of drug and family history of substance abuse were identified as risk factors for disability and pattern of drinking in adolescent; and as an important marker for future reduced work capacity (Nguyen et al., 2012). In the present study the boys were observed to have higher rate of drug and alcohol intake. This is an agreement with previous studies which showed that adolescent at risk should be counselled and the pattern of risk should be decreased (Sidorchuk, Hemmingsson, Romelsjo, & Allebeck, 2012). There were reports of substance abuse more in boys resulting in deterioration of health in Asian population (Oidwai, Ishaque, Shah, & Rahim, 2010). However, cultural influences were taken into account to avoid misinterpretation thus the data is not affected by those factors.

The Drug Use domain had the least number of negative responses with only 0.1% claimed to have ever used drugs and still a user. However, a slight higher percentage of 0.7% has claimed of ever inhaling gum. This revelation is in line with the United Nations data of 2009 that stated 3.3% to 6.1% of the global population aged 15 years and above used illicit substances at least one in the previous year (UNODC, 2011). The prevalence will likely to increase if control and preventive measures are not taken as early as possible. Existing programmes have stayed the youth from falling prey to drugs but drug taking is more of a moral and social issue rather than a medical one.

World-wide, approximately 20% of children and adolescents suffer from a disabling mental illness (WHO-1, 2005). Anxiety disorders, depression and other mood disorders, and behavioural and cognitive disorders are among the most common mental health problems among adolescents. The Mental Health domain showed worrying results although the prevalence reduces as the magnitude of the problems becomes more serious that is parallel to those mentioned above (signs of continuous sadness – 21.3%, signs of depression – 9.4% and suicidal ideation – 7.8%). The worrying results of suicidal ideation accounted to four million adolescents world-wide that have actually attempted suicide and suicide is the third leading cause of death among adolescents (WHO-2, 2001; WHO-3, 2001).

Risky Sexual Behaviour domain yielded acceptable results with only 1.6% having sexual experience before. Of those who did, 11.1% have claimed to have had same sex (homosexual) experience, 5.5% to have bisexual experience and 18.7% have claimed to have sex with more than one partner. This information, although small in prevalence, can increase over time if no action is taken. In terms of knowledge most of the respondents had poor performance in STI and HIV knowledge, opening the risk to infections in young people between the ages of 12 to 17 years old (Ramirez, et al., 2012); 15 to 24 years old are the most vulnerable group, accounting for 40% to 50% of those newly infected with HIV (UNAIDS & WHO, 2008) and STI are among the most common causes of illness in the world; having far reaching health consequences and facilitate transmission of HIV and other complications (WHO-4, 2019). By the year 2018 itself, a total of 5.9 million people are living with HIV in Asia and Pacific regions (AVERT, 2019).

## 5. Conclusion

Physical exercise and sedentary habits, dietary behaviours, mental health and road safety showed worrying results that require immediate attention. Knowledge and perception showed more amicable results with exceptions of technical jargon that is found to be difficult to comprehend by the participants. Further studies are needed for more in-depth perspective of individual domain. Advance analysis should be carried out on existing data to ascertain factors on the findings for the purpose of future interventions. This study should be continued biennially to obtain the trending of adolescents' health risk behaviour in the country.

## Acknowledgements

This research is funded by the Ministry of Health NIH Research grant (approval research code: NMRR-09-475-3922) and was fully supported by the Director General of Health Malaysia.

## Authors Contribution

MZJ is the primary author who constructed the original draft manuscript and approved the final version of the manuscript. Lee Hum Wei (LHW) is the corresponding author, revising the manuscript with MZJ and acts as the internal reader before the manuscript is approved to be submitted. SSHN, EU and NMR wrote sections of the manuscript. Baharuddin Omar (BO), Karuthan Chinna (KC), SSHN and MZJ analysed all the data in the paper and finalized the conclusion of the paper.

## Competing Interests Statement

Mohammad Zabri Johari (MZJ), Siti Sa'adiah Hassan Nudin (SSHN), Edawaty Ujang (EU) & Norazilah Mohd. Roslan (NMR) are the original research members and have received funding for the conduct of this study prior to publication. All other authors declare no conflict of interest in the writing of this paper.

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