

Hunger and Psychobehavioural Problems Among Adolescents in the Association of Southeast Asian Nations (ASEAN) Member Countries

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Abstract

Background: The prevalence of undernourishment or hunger is 9.6% in the association of southeast Asian nations (ASEAN).

Objectives: The purpose of this study was to examine the prevalence of hunger and its psychobehavioural correlates among adolescents in ASEAN member countries, including Cambodia, Indonesia, Malaysia, Myanmar, Thailand, Philippines, and Vietnam.

Methods: The analysis was based on a cross sectional survey of 30 197 school-aged children (13 - 15 years) from 7 ASEAN countries participating in the global school-based student health survey (GSHS) during 2007 - 2013.

Results: Regarding the overall prevalence of hunger, 56.9% of the subjects experienced hunger over the past month (rarely to always), while 4.2% were hungry most of the time or always (high hunger status). The prevalence of high hunger status ranged from 0.9% in Vietnam to 7.9% in Cambodia. In the adjusted multivariate logistic regression analysis, increased frequency of hunger in the past month was associated with psychological distress (loneliness, OR: 2.96, CI: 2.16 - 4.04; suicidal ideation, OR: 1.51, CI: 1.13 - 2.03; anxiety, OR: 3.42, CI: 2.54 - 4.62), substance use (tobacco use, OR: 1.90, CI: 1.34 - 2.41; alcohol use, OR: 1.76, CI: 1.32 - 2.35), behavioural problems (truancy, OR: 2.54, CI: 1.94 - 3.32; bully victimization, OR: 2.31, CI: 1.77 - 3.01; involvement in physical fights, OR: 2.57, CI: 1.97 - 3.35), and serious injury in the past year (OR: 2.61, CI: 2.00 - 3.41).

Conclusions: In order to improve psychobehavioural health among adolescents in ASEAN member countries, the possible contribution of hunger or food insecurity should be taken into account.

Keywords: Adolescents, Asia, Health Surveys, Hunger, Injuries, Mental Health, Violence

1. Background

Hunger is an individual-level physiological condition, which may result from food insecurity. Food insecurity is a household-level economic and social condition, associated with limited or uncertain access to adequate food (1). In member countries of the association of southeast Asian nations (ASEAN), the prevalence of hunger or undernourishment has been estimated at 9.6%. The prevalence has been reported at 14.2% in Cambodia and Myanmar, 13.5% in the Philippines, 11.0% in Vietnam, 7.6% in Indonesia, 7.4% in Thailand, and < 5% in Malaysia (2).

In a previous study, according to the global hunger index, including undernourishment, child stunting, wasting, and mortality, serious hunger was reported in Cambodia, Indonesia, Myanmar, and Philippines (scores, 20.1 - 23.5) and moderate hunger was indicated in Malaysia, Thailand, and Vietnam (scores, 10.3 - 19.9) (3). In addition, among children under 5 years, chronic undernourishment or stunted growth was still prevalent in a number of ASEAN countries, including Myanmar (35.1%), Philippines (33.6%),

Vietnam (23.3%), Malaysia (17%), and Thailand (16%) at different time points during 1993 - 2011 (2).

According to studies among adolescents in Asia, 1.3% of the population were often or always hungry in rural China (4), while in a small local study in Bangalore, India, 14.7% of the subjects experienced hunger (rarely, sometimes, often, or always) (5). Moreover, in rural Goa, India, 59.2% of the adolescent students experienced hunger due to inadequate food intake (6), and in a national study of adolescents in Taiwan, 10% reported experiences of hunger or thirst over the last year (7).

In 7 sub-Saharan countries, the prevalence of hunger in the past month (often or always) was the highest in Zambia (28.7%), followed by Kenya (14.7%), Botswana (13.9%), Malawi (12.5%), and Uganda (9.3%) (8-10). In the Americas, according to a study in Canada, 25.1% of the population sometimes, often, or always experienced hunger, while 3.8% were often or always hungry (11). Moreover, in another study in Canada, the prevalence of hunger among children was 5.7% (never, yes, or no) (12), while in Ecuador, 41.2% of the students reported hunger (rarely, sometimes, mostly,

or always) (13).

According to various studies, adolescents with hunger or food insecurity are at an increased risk of adverse emotional or behavioural outcomes, including reduced emotional and mental health, anxiety, sadness, loneliness, social isolation, depression, suicidal ideation, alcohol use, substance use disorders, drug abuse, bully victimization, involvement in physical fights, truancy, and arrogant behaviors at school towards teachers (antisocial behaviors) (8, 10-15).

Overall, there is a scarcity of research on hunger and its psychobehavioural correlates among adolescents in ASEAN countries. The purpose of this study was to examine the prevalence of hunger and its psychobehavioural correlates among adolescents in ASEAN member countries, including Cambodia, Indonesia, Malaysia, Myanmar, Thailand, Philippines, and Vietnam, which prompted this study.

2. Objectives

The objective of this study was to examine hunger and its psychobehavioural correlates among adolescents in ASEAN member countries.

3. Materials and Methods

3.1. Study Sample and Procedure

This study included a secondary analysis of cross sectional data from the global school-based student health survey (GSHS) in ASEAN member states, including Cambodia, Indonesia, Malaysia, Myanmar, Thailand, Philippines, and Vietnam during 2007 - 2013 (16). All ASEAN countries with publicly available GSHS datasets were included in the analysis. A 2-stage cluster sampling design was used to collect data for representing all students in grades 6 - 10 from each country (16).

In the first stage of sampling, schools were selected via probability proportional to size (PPS) sampling (16). In the second stage, classes in the schools were randomly selected, and all students in the selected classes were considered eligible to participate in the study, irrespective of their age (16). Students independently completed the questionnaires under the supervision of trained research assistants (16). The GSHS proposal has been approved by the world health organization, as well as the ministries of education and health in each country. In addition, informed consents were obtained from all the participants and their parents (16).

The sample size was determined, based on similar studies in this area. Among 7 countries, the prevalence of

hunger (mostly or always) in the past month ranged from 28.7% in Zambia to 3.7% in Tanzania (8-10). Using Epi Info software for sample size calculation, the sample size was determined, considering a maximum prevalence of 30%, confidence interval (CI) of 1, a cluster of 7 ASEAN countries, and confidence level of 99.99% (sample, 30 821).

3.2. Measures

The instrument used in this study included GSHS (16), as described in Table 1. In a previous validation study, GSHS was reported to have acceptable validity. The average agreement between test and retest results was 77%, and the average Cohen's kappa coefficient was 0.47 (17).

3.3. Data Analysis

Stata version 13.0 (Stata Co., college station, Texas, USA) was used for data analysis. The study sample from each country was restricted to the age group of 13 - 15 years to facilitate comparisons among the samples from different countries. The associations between hunger and psychosocial indicators among school children were determined, based on odds ratios (ORs). Multivariate logistic regression analysis was employed to estimate the effect of independent variables (hunger, sociodemographic characteristics, and protective sociofamilial factors) on psychobehavioural outcomes (binary dependent variables) after adjusting for age, gender, country's income, peer support, parental/guardian supervision, bonding, and connectedness. Regarding the multistage design of the survey, P value and 95% CI were adjusted.

4. Results

4.1. Sample Characteristics

The study sample included 30 197 students (age range, 13 - 15 years) from 7 ASEAN member countries. The overall response rate ranged from 82% in the Philippines to 96% in Vietnam. The sample size in the evaluated countries ranged from 1732 in Cambodia to 16 050 in Malaysia, including 14 696 (48.5%) males and 15 459 (51.5%) females (mean age, 14.1 ± 0.8 years).

The year in which GSHS was implemented in each country varied from 2007 in Indonesia and Myanmar to 2013 in Cambodia and Vietnam. The secondary school gross enrolment ratio was 71% in Malaysia, 83% in Indonesia, 85% in the Philippines, and 86% in Thailand, while no information was available for Cambodia or Myanmar (18). In terms of the overall prevalence of hunger in 7 ASEAN countries, 56.9% of the subjects experienced hunger rarely to always in the past month, while 4.2% felt hungry most of the time or always (high hunger status). The prevalence of

Table 1. Description of the Variables

Variables	Questions	Options
Hunger	During the past 30 days, how often did you go hungry because there was not enough food at home?	1 = never, 2 = rarely, 3 = sometimes, 4 = most of the time, 5 = always
Psychobehavioural problems		
Loneliness	During the past 12 months, how often have you felt lonely?	1 = never to 5 = always (coded 1-3 = 0 and 4-5 = 1)
Suicidal ideation	During the past 12 months, did you ever seriously consider attempting suicide?	1 = yes, 2 = no
Anxiety	During the past 12 months, how often have you been so worried about something that you could not sleep at night?	1 = never to 5 = always (coded 1-3 = 0 and 4-5 = 1)
Current cigarette smoking	During the past 30 days, how many days did you smoke cigarettes?	1 = 0 days to 7 = all 30 days (coded 1 = 0 and 2-7 = 1)
Current use of other tobacco products	During the past 30 days, how many days did you use any type of tobacco products such as tobacco leaves?"	1 = 0 days to 7 = all 30 days (coded 1 = 0 and 2-7 = 1)
Current alcohol use	During the past 30 days, on how many days did you have at least 1 alcoholic drink?	1 = 0 days to 7 = all 30 days (coded 1 = 0 and 2-7 = 1)
Truancy	During the past 30 days, how many days did you miss classes or school without permission?	1 = 0 days to 5 = 10 or more days (coded 1 = 0 and 2-5 = 1)
Bully victimization	During the past 30 days, how many days were you bullied?	1 = 0 days to 7 = all 30 days (coded 1 = 0 and 2-7 = 1)
Involvement in physical fights	During the past 12 months, how many times were you in a physical fight?	1 = 0 times to 8 = 12 or more times (coded 1 = 0 and 2-8 = 1)
Injury	During the past 12 months, how many times were you seriously injured? (An injury is serious when it makes you miss at least 1 full day of usual activities such as school attendance, sports activities, or job or when treatment by a doctor or medical personnel is required.)	1 = 0 times to 8 = 12 or more times (coded 1 = 0 and 2-8 = 1)
Protective sociofamilial factors		
Peer support	During the past 30 days, how often were most of the students in your school kind and helpful?	1 = never to 5 = always (coded 1-3 = 0 and 4-5 = 1)
Parental or guardian supervision	During the past 30 days, how often did your parents or guardians check to see if your homework was done?	1 = never to 5 = always (coded 1-3 = 0 and 4-5 = 1)
Parental or guardian connectedness	During the past 30 days, how often did your parents or guardians understand your problems and concerns?	1 = never to 5 = always (coded 1-3 = 0 and 4-5 = 1)
Parental or guardian bonding	During the past 30 days, how often did your parents or guardians really know what you were doing with your free time?	1 = never to 5 = always (coded 1-3 = 0 and 4-5 = 1)

high hunger status ranged from 0.9% in Vietnam to 7.9% in Cambodia (Table 2).

4.2. Factors Associated with Psychobehavioural Problems

In bivariate and adjusted multivariate logistic regression analyses, increased frequency of hunger in the past month was associated with psychological distress (loneliness, suicidal ideation, and anxiety), substance use (tobacco and alcohol), behavioural problems (truancy, bully victimization, and involvement in physical fights), and serious injury in the last year (Table 3).

5. Discussion

In the present study, the prevalence of hunger in the past month was high (rarely to always, 56.9%; most of the time or always, 4.2%) in 7 ASEAN countries with major differences; the lowest rate was reported in Vietnam and Myanmar and the highest was found in Cambodia and the Philippines. These findings are greatly comparable with previous studies among adolescents in Ecuador (13), India (6), Taiwan (7), and Canada (11, 12). On the other hand, the prevalence of hunger in this study was higher than previous studies performed in rural China (4) and Bangalore, India (5).

Nevertheless, the prevalence of hunger was signifi-

Table 2. Descriptive Data of Hunger Status in School-Aged Students (13 -15 Years)

Variables	Sample N	The Percentage of Subjects Reporting Hunger in the Past 30 Days Due to Inadequate Food at Home			
		Never	Rarely	Sometimes	Mostly/Always
All	30197	43.1	25.3	27.3	4.2
Cambodia	1732	48.5	20.2	23.4	7.9
Indonesia	2864	35.3	27.0	31.8	5.8
Malaysia	16050	39.3	28.5	27.8	4.4
Myanmar	1974	64.7	6.6	26.1	2.6
Philippines	3625	35.5	26.5	31.8	6.2
Thailand	2219	47.7	23.5	25.8	3.2
Vietnam	1733	50.8	28.7	19.5	0.9
Gender					
Female	15459	45.3	24.8	26.6	3.3
Male	14696	40.9	25.9	28.1	5.2
Age (years)					
13	9102	42.6	21.6	30.9	4.9
14	10941	42.5	26.8	26.3	4.4
15	10154	44.2	26.4	25.9	3.6
Country's income					
Low ^a /lower Middle ^b	11928	42.8	25.3	27.6	4.4
Upper middle ^c	18269	44.4	25.3	26.6	3.7
Parental supervision					
No	21247	39.5	26.6	29.5	4.4
Yes (mostly/always)	7001	50.6	22.9	22.8	3.7
Parental connectivity					
No	18363	39.1	27.1	29.5	4.3
Yes(mostly/always)	9933	50.7	22.2	23.2	3.9
Parental bonding					
No	15608	37.3	26.8	31.1	4.7
Yes (mostly/always)	12642	50.8	23.5	22.3	3.4
Peer support					
No	16326	38.5	26.2	30.7	4.6
Yes (mostly/always)	11992	49.7	24.5	22.4	3.5

^a Cambodia.^b Indonesia, Myanmar, Philippines, and Vietnam.^c Malaysia and Thailand (19).

cantly lower in this study, compared to rates reported among adolescents in 7 sub-Saharan countries (8-10). The differences in the prevalence of hunger among ASEAN countries agree with previous reports on the high preva-

lence of hunger or undernourishment in Cambodia and the Philippines (based on the Global Hunger Index) and the lower prevalence of hunger in only 2 upper-middle income countries (Malaysia and Thailand)(2,3). Surprisingly,

Table 3. The Relationships Between Hunger and Poor Mental and Health Behaviours

Variables	Psychobehavioural Outcomes	Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI) ^a
Loneliness			
Never	7.0	1 (Reference)	1 (Reference)
Rarely	10.8	1.69 (1.45 - 1.96)	1.52 (1.20 - 1.92)***
Sometimes	11.9	1.89 (1.64 - 2.16)***	1.68 (1.39 - 2.03)***
Mostly or always	17.8	2.80 (2.18 - 3.61)***	2.96 (2.16 - 4.04)***
Suicidal ideation			
Never	8.6	1 (Reference)	1 (Reference)
Rarely	12.0	1.54 (1.36 - 1.74)***	1.25 (1.05 - 1.50)*
Sometimes	10.8	1.44 (1.24 - 1.68)***	1.13 (0.95 - 1.36)
Mostly or always	13.2	1.81 (1.44 - 2.26)***	1.51 (1.13 - 2.03)**
Anxiety			
Never	5.3	1 (Reference)	1 (Reference)
Rarely	7.4	1.53 (1.31 - 1.78)***	1.35 (1.11 - 1.65)**
Sometimes	8.9	1.88 (1.61 - 2.19)***	1.59 (1.27 - 1.98)***
Mostly or always	16.8	3.54 (2.71 - 4.62)***	3.42 (2.54 - 4.62)***
Tobacco use			
Never	6.4	1 (Reference)	1 (Reference)
Rarely	10.1	1.63 (1.41 - 1.88)***	1.44 (1.16 - 1.78)***
Sometimes	10.6	1.68 (1.43 - 1.97)***	1.42 (1.18 - 1.71)***
Mostly or always	14.1	2.24 (1.82 - 2.76)***	1.90 (1.34 - 2.41)***
Alcohol use			
Never	10.4	1 (Reference)	1 (Reference)
Rarely	14.0	1.50 (1.31 - 1.71)***	1.27 (1.05 - 1.54)*
Sometimes	11.4	1.24 (1.06 - 1.46)**	0.96 (0.78 - 1.19)
Mostly or always	18.4	1.50 (1.13 - 1.98)**	1.76 (1.32 - 2.35)***
Tuancy			
Never	18.8	1 (Reference)	1 (Reference)
Rarely	27.8	1.46 (1.30 - 1.65)***	1.52 (1.35 - 1.71)***
Sometimes	29.3	1.64 (1.46 - 1.85)***	1.61 (1.42 - 1.82)***
Mostly or always	40.4	2.40 (1.85 - 3.11)***	2.54 (1.94 - 3.32)***
Bully victimization			
Never	26.6	1 (Reference)	1 (Reference)
Rarely	37.8	1.69 (1.50 - 1.90)***	1.57 (1.38 - 1.78)**
Sometimes	46.2	2.37 (2.16 - 2.59)***	2.10 (1.85 - 2.40)**
Mostly or always	48.4	2.99 (2.44 - 3.65)***	2.31 (1.77 - 3.01)***
Involvement in physical fights			
Never	22.9	1 (Reference)	1 (Reference)
Rarely	33.4	1.57 (1.38 - 1.79)***	1.56 (1.37 - 1.79)***
Sometimes	35.8	1.84 (1.67 - 2.03)***	1.68 (1.51 - 1.88)***
Mostly or always	47.2	3.11 (2.56 - 3.78)***	2.57 (1.97 - 3.35)***
Injury			
Never	30.3	1 (Reference)	1 (Reference)
Rarely	42.4	1.67 (1.49 - 1.87)***	1.60 (1.41 - 1.81)***
Sometimes	49.6	2.20 (1.99 - 2.45)***	2.06 (1.82 - 2.34)***
Mostly or always	55.6	3.17 (2.53 - 3.96)***	2.61 (2.00 - 3.41)***

^aAdjusted for age, gender, country's income, parental or guardian supervision, bonding, connectedness, and peer support.

the present study reported a low prevalence of hunger in Myanmar, while previous studies have classified this country as having a serious hunger problem (based on the

global hunger index) (3).

Concurrent with several previous studies (8, 10-15), the present study found an association between increased fre-

quency of hunger in the past month and psychological distress (loneliness, suicidal ideation, and anxiety), substance use (tobacco and alcohol use), and behavioural problems (truancy, bully victimization, and involvement in physical fights). These findings raise some concerns, considering the high occurrence of hunger in the study sample.

Furthermore, this study reported an association between hunger and injury in the last year. Pickett et al. (20) found that hunger was positively correlated with specific injuries (due to street quarrels and physical fights). It is possible that adolescents who engage in an increasing number of risky behaviours also experience a higher risk of injury (21). In addition, stress (stress surrounding food security) may predict psychobehavioural problems among these adolescents (12).

In this regard, a model suggested that childhood development adversity, which may extend to hunger through different mechanisms (eg, attachment problems), can result in mental health problems in later stages of life (12, 22). Some evidence also suggests that low calorie intake may be associated with increased physiological and emotional reactivity and cause mental problems (23, 24). Therefore, to overcome hunger-related problems, it may be necessary to address social factors or stressors at home (eg, lack of control in life) with an integrated approach (11).

In the present study, the strength of GSHS administration was the utilization of a standardized method and questionnaire in 7 ASEAN countries. However, as the survey had a cross sectional design and only included school-aged children, no causal inferences or generalizations could be made for all the children. Moreover, hunger was only assessed with 1 question; therefore, assessment of this phenomenon was limited. Furthermore, socioeconomic status was not assessed, and in future studies, food insecurity and socioeconomic status should be examined.

In conclusion, the present study reported a high prevalence of hunger among school-aged adolescents in 7 ASEAN countries. Further quantitative and qualitative research is recommended to better understand the social circumstances, leading to hunger during adolescence in ASEAN member countries. Incorporation of food programmes (including school feeding programmes) and targeting hunger among ASEAN children may require the use of a more integrative approach incorporating care (eg, devoting time, support, and attention to a range of child developmental needs). Programmes to improve psychobehavioural health among ASEAN adolescents should consider the potential contribution of hunger or food insecurity.

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Footnotes

Authors' Contribution: Both authors (Karl Peltzer and Supa Pengpid) contributed to the study design, interpretation of data, drafting and revision of the manuscript, and final approval of the paper

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References

1. United States department of agriculture and economic research service (USDA). . Definitions of Food Security 2015. [cited 20 May]. Available from: <https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/definitions-of-food-security.aspx>.
2. Food and Agriculture Organizations of the United Nations (FAO). . Regional overview of food insecurity Asia and the Pacific: Towards a foodsecure Asia and the Pacific. Bangkok: FAO; 2015.
3. International food policy research institute (IFPRI). . Global Hunger Index 2015. [cited 20 May]. Available from: <http://ghi.ifpri.org/> [accessed].
4. Gao Y, Li LP, Kim JH, Congdon N, Lau J, Griffiths S. The impact of parental migration on health status and health behaviours among left behind adolescent school children in China. *BMC Public Health*. 2010;**10**:56. doi: [10.1186/1471-2458-10-56](https://doi.org/10.1186/1471-2458-10-56). [PubMed: [20128901](https://pubmed.ncbi.nlm.nih.gov/20128901/)].
5. Bamamurugan G, Pravhudeva SS. Prevalence and correlates of hunger among private aided secondary school children in Bangalore. *Int J Nurs*. 2015;**4**:66-8.
6. Banerjee S, Dias A, Shinkre R, Patel V. Under-nutrition among adolescents: a survey in five secondary schools in rural Goa. *Natl Med J India*. 2011;**24**(1):8-11. [PubMed: [21608350](https://pubmed.ncbi.nlm.nih.gov/21608350/)].
7. Feng JY, Chang YT, Chang HY, Fetzter S, Wang JD. Prevalence of different forms of child maltreatment among Taiwanese adolescents: a population-based study. *Child Abuse Negl*. 2015;**42**:10-9. doi: [10.1016/j.chiabu.2014.11.010](https://doi.org/10.1016/j.chiabu.2014.11.010). [PubMed: [25477233](https://pubmed.ncbi.nlm.nih.gov/25477233/)].
8. Arat G. The link between nutrition and mental health in sub-saharan african adolescents: Findings from the global school-based health survey. *Global Soc Welfare*. 2016.

9. Mwambene JB, Muula AS, Leo JC. Prevalence and correlates of hunger among primary and secondary school children in Malawi: results from the 2009 Global School-based Health Survey. *Malawi Med J*. 2013;**25**(2):45-9. [PubMed: 24098830].
10. Swahn MH, Bossarte RM, Gaylor E, Elimam EM, Walingo MK. Associations between hunger and emotional and behavioral problems: A comparison between students in Botswana, Kenya, Uganda, and Zambia. *Int J Public Health*. 2010;**2**:185-94.
11. Pickett W, Michaelson V, Davison C. Beyond nutrition: hunger and its impact on the health of young Canadians. *Int J Public Health*. 2015;**60**(527-38).
12. McIntyre L, Williams JV, Lavorato DH, Patten S. Depression and suicide ideation in late adolescence and early adulthood are an outcome of child hunger. *J Affect Disord*. 2013;**150**:123-9.
13. Romo ML, Abril-Ulloa V, Kelvin EA. The relationship between hunger and mental health outcomes among school-going Ecuadorian adolescents. *Soc Psychiatry Psychiatr Epidemiol*. 2016;**51**(6):827-37. doi: 10.1007/s00127-016-1204-9. [PubMed: 27083901].
14. McLaughlin KA, Green JG, Alegria M, Jane Costello E, Gruber MJ, Sampson NA, et al. Food insecurity and mental disorders in a national sample of U.S. adolescents. *J Am Acad Child Adolesc Psychiatry*. 2012;**51**(12):1293-303. doi: 10.1016/j.jaac.2012.09.009. [PubMed: 23200286].
15. Poole-Di Salvo E, Silver EJ, Stein RE. Household Food Insecurity and Mental Health Problems Among Adolescents: What Do Parents Report? *Acad Pediatr*. 2016;**16**(1):90-6. doi: 10.1016/j.acap.2015.08.005. [PubMed: 26530851].
16. Centers for Disease Control (CDC). The global school and health survey background, 2015 [cited 18 May]. Available from: <http://www.cdc.gov/gshs/background/index>.
17. Becker AE, Roberts AL, Perloe A, Bainivualiku A, Richards LK, Gilman SE, et al. Youth health-risk behavior assessment in Fiji: the reliability of Global School-based Student Health Survey content adapted for ethnic Fijian girls. *Ethn Health*. 2010;**15**(2):181-97. doi: 10.1080/13557851003615552. [PubMed: 20234961].
18. The World Bank. Gross enrollment ratio, secondary, both sexes 2015. [cited 20 May]. Available from: <http://data.worldbank.org/indicator/SE.SEC.ENRR>.
19. The World Bank. Countries and economies 2015. [cited 20 May]. Available from: <http://data.worldbank.org/country/>.
20. Pickett W, Molcho M, Simpson K, Janssen I, Kuntsche E, Mazur J, et al. Cross national study of injury and social determinants in adolescents. *Inj Prev*. 2005;**11**(4):213-8.
21. Russell K, Davison C, King N, Pike I, Pickett W. Understanding clusters of risk factors across different environmental and social contexts for the prediction of injuries among Canadian youth. *Injury*. 2016;**47**(5):1143-50.
22. Cassidy J, Shaver PR. Handbook of attachment: Theory, research and clinical applications. New York: Guilford Press; .
23. Macht M. Effects of high- and low-energy meals on hunger, physiological processes and reactions to emotional stress. *Appetite*. 1996;**26**(1):71-88.
24. McLaughlin KA, Kubzansky LD, Dunn EC, Waldinger R, Vaillant G, Koenen KC. Childhood social environment, emotional reactivity to stress, and mood and anxiety disorders across the life course. *Depress Anxiety*. 2010;**27**(12):1087-94. doi: 10.1002/da.20762. [PubMed: 21132844].