

Association between sociodemographic factors and mental health status among secondary school students in Cambodia: a cross-sectional study using SDQ

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ABSTRACT

Adolescent mental health significantly influences social well-being and academic achievement, yet empirical data remains scarce in Cambodia. This study examined the association between sociodemographic characteristics and mental health status among Cambodian secondary school students using the Strengths and Difficulties Questionnaire (SDQ). A cross-sectional survey was conducted from March to April 2024 across five major provinces and Phnom Penh. Using purposive sampling, 1,528 students from urban and rural schools were recruited. Abnormal mental health was reported by 50.56% of females and 52.33% of students whose mothers had only elementary education. T-test and ANOVA analyses revealed significant associations between mental health and gender, school location, school type, and maternal education ($p < 0.001$), while socioeconomic status showed no significant impact. Findings emphasize that gender and maternal education are primary correlates of psychological well-being. These results necessitate gender-responsive school health programs and decentralized mental health services in rural areas. Furthermore, community initiatives should prioritize maternal health literacy to empower mothers as central caregivers, fostering supportive home environments for student resilience.

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1. INTRODUCTION

While health is defined as a state of complete physical, mental, and social well-being, mental health disorders represent a significant global burden that is often neglected among adolescents who face complex biological, psychological, and social transitions [1]. Currently, more than 10% of children and adolescents are diagnosed with mental disorders before the age of 18 years, placing them at risk for long-term developmental impairment and poor academic achievement [2], [3]. In addition, research in Southeast Asia has highlighted a critical need for localized strategies for these students [4] to address the negative impacts of this mental burden, which often results in school dropout, depression, and victimization [5]. For instance, a cross-sectional study by Vo *et al.* [6] using a self-report emotional intelligence test found that 51.6% of Vietnamese undergraduate students experienced mental issues, with females being at significant higher risk. Similarly, Tanaka *et al.* [7], identified a clear association between psychological distress and lifestyle factors, including family structure and exercise habits in the region.

Cambodia, as a low-income country, faces significant mental health challenges, with the figures for those experiencing poor mental health being five times higher than the worldwide average [8]. Recent data have reported a high prevalence of mental disorders in adolescents and children, consisting of anxiety (27%), depression (17%), and post-traumatic stress (8%), while 5% of children experienced other mental health-related problems [9]. It has been suggested that mental health support should involve the creation of a curriculum for mental health care in school, spreading basic strategies for dealing with stress, problems, and difficulties experienced by students [10]. Cambodia lacks sufficient human resources and infrastructure and faces cultural barriers, with approximately 68% of the population unable to access mental health services [11].

Despite the known impact of mental health on social well-being and academic achievement, a critical unsolved problem is the lack of empirical data regarding how specific sociodemographic variables interact with mental health status in Cambodian secondary schools. This assessment has not been previously explored in this specific context of Cambodia. This research is guided by the social determinants of health (SDH) framework, which posits that environmental and familial factors are primary drivers of adolescent well-being. Grounded in this theory, we hypothesize that female students and those in rural areas will experience significantly higher psychological distress due to localized cultural stressors and geographical service gaps. Additionally, we predicted that maternal education rather than household wealth will serve as the key protective mechanism for students' mental health [12]. This study addresses this gap by examining the association between demographic characteristics and mental health status among secondary school students in Cambodia using Khmer-translated Strengths and Difficulties Questionnaire (SDQ). By identify these specific influences, this study provides the empirical foundation required to develop gender-responsive and family-engaged mental health programs in Cambodia. The novelty of this study is rooted in being the first large-scale empirical assessment of adolescent mental health in Cambodia using a culturally adapted Khmer-SDQ framework across both urban and rural demographics. Unlike the previous regional studies that focus primarily on socioeconomic status, this research explicitly isolates maternal education as a distinct, potent predictor of adolescent psychological resilience in a post-conflict developing nation context. The sections that follow demonstrate these findings by detailing our cross-sectional methodology, presenting the statistical results of our t-test and ANOVA analyses, and discussing the practical implications for school curriculum development. Furthermore, SDQ is a widely used instrument due to its low cost and validity. In this study, it is employed to assess the mental health problems, behavioral problems, and strengths of children and adolescents. It consists of 25 questions, divided into the following five items: emotional symptoms, conduct problems, hyperactivity, peer problems, and prosocial behavior. The initial four factors are identified as total difficulties, while the fifth factor is defined as strengths [5], [13], [14].

2. METHOD

2.1. Study design

This descriptive cross-sectional investigation was conducted at secondary schools in 5 major provinces (Kandal, Kompong Thom, Kompong Cham, Svay Rieng, Kampong Chhnang) and Phnom Penh from March to April 2024. The participants included current secondary school students from both urban and rural areas attending private and public schools across Cambodia. The students ranged from grades 7–12, aged 12–18 years old; individuals under 10, over 18 years old, or those not currently enrolled in secondary school were excluded from the study. The response rate was about 89.88% of participants. Purposive sampling was conducted by selecting participants from distinct demographics and accessible school with internet connection, allowing the data to be gathered within the available timeframe. Prior to data collection, formal ethical consent was obtained from students. Students who volunteered to complete the survey were assured of its confidentiality. Data were collected through a self-administered online survey distributed via Google Forms. First, teacher guided the students how to complete the survey step-by-step, allowing students understand each question and properly answers. After that, the teachers shared the survey link with students during class sessions, ensuring that each student had access to a smartphone and a stable internet connection. The questionnaire was adopted from the SDQ in English and translated into the Khmer language for the students' convenience and back-translated to English to ensure accuracy by bilingual researchers. Additionally, a paper-based survey was served to accommodate students without smartphone or school without internet assessable to avoid the bias of data collection. The survey was administered according to a schedule coordinated with school administrators to align with student availability. This approach was selected to ensure a high response rate to provide a comfortable, non-pressured environment for students to reflect on the questionnaire.

2.2. Instrument

The SDQ is a validated tool and has been discussed in many literature reviews of Asia population [5], [15], and used by specialists and instructors to measure the mental health status of children and adolescents. It is internationally recognized as low-cost instrument that has ability to provide comprehensive screening of both behavioral difficulties and prosocial strengths. SDQ consists of 25 questions that determine five different factors: emotional symptoms, conduct problems, hyperactivity problems, peer problems, and prosocial behavior. Each item is scored on a 3-point scale with 0 = not true, 1 = somewhat true, and 2 = certainly true. The total score for each item is the sum of all scores ranging from 0–10, whereas the total difficulties score is the sum of emotional symptoms, conduct problems, hyperactivity problems, and peer problem scores, ranging from 0–40. The strengths of students are shown in the prosocial score, ranging from 0–10 [16]–[18]. The Cronbach's alpha for Khmer version questionnaire was 0.857, considered to be reliable and acceptable. In the first section, students are asked about their demographic background, including variables such as gender, age, grade, location, school type, mother's education, and socioeconomic status.

2.3. Data analysis

The raw data from online and paper surveys were first compiled and screened for completion and consistency. The responses with missing data or repetitive pattern were excluded to ensure the quality of dataset. All categorical variables were standardized and coded in numerical format suitable for statistical processing. The final cleaned dataset was then imported to SPSS V.25 for analysis. The analysis was conducted using descriptive statistics for the demographic background of students, followed by inferential statistics consisting of hypothesis analysis using t-test and one-way ANOVA to test the demographic differences in gender, school type, school location, mother's education, and socioeconomic status. The significant level threshold was set at 0.05. Before performing the independent sample t-test and one-way ANOVA, the assumption of normality was assessed for the continuous outcome variable (score of each SDQ variable) within each demographic category. The Shapiro-Wilk test was applied, and the results indicated that the data were approximately normally distributed across the comparison groups ($p > .05$). Additionally, visual inspections using Q-Q plots supported the assumption of normality. Therefore, the parametric tests were deemed appropriate for the analysis.

3. RESULTS

Table 1 presents the basic sociodemographic variables of the 1,528 students across Cambodia. The demographic distribution showed a higher proportion of female participants (58.77%) compared to males (41.23%). The majority of the students attend public schools (86.71%) and were located in rural areas (61.45%). Regarding maternal background, the largest group of mothers had completed only elementary education (35.14%), while a minority held undergraduate degrees (10.93%). Socioeconomic status was distributed with 41.1% high, 28.9% medium, and 30% low.

Table 2 presents the emotional and mental health status of participants, categorized by various sociodemographic variables. Notably, over half of the female population (50.56%) fell into the abnormal category, compared to 38.25% of males. Geographical and educational disparities were also evident; students in rural locations (47.39%) and those whose mothers had only elementary education (52.33%) reported the highest percentages of abnormal emotional health. Conversely, the undergraduate maternal education category showed the highest percentage of students with normal emotional health (43.71%).

Table 3 shows several significant differences in mental health indicators across gender, school location, and school type. Female students reported significantly higher scores than males for emotional symptoms ($t = 9.34$), conduct problems ($t = 2.41$), hyperactivity ($t = 7.50$), and prosocial behavior ($t = 8.33$), with all p-values showing high significance. Regarding school location, students from rural schools reported significantly more peer problems ($t = -3.14$, $p = .002$) compared to urban counterparts. Similarly, students attending public schools had significantly more peer problems ($t = -2.792$, $p = .005$) and prosocial behavior ($t = -2.830$, $p = .005$) than those at private schools.

Table 1. Basic socioeconomic and demographics of categorical variables for secondary school students

Variables	Category	Frequency (%)	Variable	Category	Frequency (%)
Gender	Male	630 (41.23%)	Mother's education	Graduate	34 (2.23%)
	Female	898 (58.77%)		Undergraduate	167 (10.93%)
School type	Public	1325 (86.71%)	School location	Secondary	600 (29.27%)
	Private	203 (13.29%)		Elementary	537 (35.14%)
Socioeconomic status	High	628 (41.1%)		Others	190 (12.43%)
	Medium	441 (28.9%)	School location	Urban (city)	589 (38.54%)
	Low	459 (30%)		Rural (rural)	939 (61.45%)

Table 2. Mental health status by demographic variables

Sociodemographic variable		Emotional mental health		
		Abnormal N (%)	Borderline N (%)	Normal N (%)
Gender	Female	454 (50.56)	172 (19.15)	272 (30.29)
	Male	241 (38.25)	115 (18.25)	274 (43.49)
School location	Urban	250 (42.44)	115 (19.52)	224 (38.03)
	Rural	445 (47.39)	172 (18.32)	322 (34.29)
School type	Private	88 (43.35)	37 (18.23)	78 (38.42)
	Public	607 (45.81)	250 (18.87)	468 (35.32)
Mother's education	Elementary	281 (52.33)	93 (17.32)	168 (30.32)
	Secondary	250 (41.67)	119 (19.83)	231 (38.50)
	Undergraduate	62 (37.13)	32 (19.16)	73 (43.71)
	Graduate	16 (47.06)	5 (14.71)	13 (38.24)
Socioeconomics	Other	86 (45.26)	38 (20.00)	66 (34.74)
	Lower	221 (50.11)	81 (18.37)	139 (31.52)
	Middle	215 (46.84)	87 (18.95)	157 (34.20)
	High	259 (41.24)	119 (18.95)	250 (39.81)

Table 3. Association between mental health and statistical data by the independent t-test

Classification			Variable				
			Emotional symptoms	Conduct problem	Hyperactivity	Peer problem	Prosocial behavior
Gender	Female (n = 898)	Mean	6.44	2.66	5.39	4.84	4.22
		SD	2.466	1.942	2.495	2.246	1.093
	Male (n = 630)	Mean	5.21	2.41	4.38	4.87	3.73
		SD	2.614	2.085	2.710	2.237	1.180
	Value	t-value	9.34	2.41	7.50	-0.269	8.33
		p-value	<0.01	<0.05	<0.01	0.788	<0.01
	95% confidence interval of difference	Lower	0.970	0.047	0.745	-0.260	0.374
		Upper	1.486	0.455	1.273	0.197	0.605
	School location	Mean	6.04	2.54	5.02	4.99	4.09
		SD	2.602	2.009	2.606	2.216	1.133
School types	Urban (n = 598)	Mean	5.78	2.58	4.90	4.62	3.91
		SD	2.587	2.002	2.675	2.265	1.181
	Value	t-value	-1.908	0.340	-0.889	-3.140	-2.982
		p-value	0.057	0.734	0.374	<0.01	<0.05
	95% confidence interval of difference	Lower	-0.528	-0.171	-0.394	-0.599	-0.299
		Upper	0.007	0.243	0.148	-0.138	-0.062
	Private (n = 203)	Mean	5.77	2.57	4.88	4.44	3.81
		SD	2.645	2.058	2.830	2.182	1.172
	Public (n = 1325)	Mean	5.96	2.56	4.99	4.91	4.05
		SD	2.591	1.998	2.602	2.245	1.149
Value	t-value		-0.957	0.703	-0.583	-2.792	-2.830
			0.339	0.942	0.560	<0.01	<0.01
	95% confidence interval of difference	Lower	-0.572	-0.286	-0.505	-0.801	-0.416
		Upper	0.197	0.308	0.274	-0.140	-0.075

Table 4 (see Appendix) highlights the significant differences in several mental health outcomes based on the mother's education level. Significant differences were found across emotional symptoms ($F = 5.601$, $p < .001$), hyperactivity ($F = 3.255$, $p = .003$), peer problems ($F = 3.109$, $p = .005$), and prosocial behavior ($F = 3.854$, $p = .001$). Although maternal education significantly influenced several mental health subscales, the associated effect size ($\eta_p^2 = 0.008$ to 0.015), suggests a small but clinically relevant associates on student well-being. In contrast, socioeconomic status was not significantly associated with any of the mental health subscales, with p-values ranging from 0.086 to 0.555. This indicates that maternal literacy may be a more potent protective factor for Cambodian students than household wealth.

4. DISCUSSION

The prevalence of mental health issues in secondary school students was found to be significantly associated with several sociodemographic variables. Gender, school location, school type, and mother's education were revealed to be important factors influencing mental well-being [19]-[21]. The findings of this study showed no significant difference in socioeconomic status. Abnormal scores were revealed in 50.56% of the female population, with the mother's elementary school education level being attributed to an abnormal score of 52.33%. Other factors, such as school location and school type, indicated slightly higher abnormal, borderline, and normal scores for mental health.

The analysis revealed significant differences in mental health in terms of gender for emotional symptoms, conduct problems, hyperactivity, and prosocial behavior. This finding aligned with the previous research in Vietnam and Indonesia population. Female students reported higher levels compared to males due to cultural and societal factors and consciousness toward physical appearance [5], [6]. Research conducted on students in Indonesia demonstrated that the significant difference in female mental health could relate to menstruation, biological processes, or the gene expression mechanism [22]. These menstrual problems may be caused by physical issues, such as structural anomalies in the uterus, or hormonal imbalances resulting from poor diet and lack of exercise. Additionally, medical conditions like thyroid issue or benign pituitary tumors can disrupt hormones, leading to increased anxiety, stress, and a higher risk of depression among female students [23]. There is a study on the mental health of high school students in Cambodia, which reported that females were more likely to face mental problems and ask for help or treatment from informal sources such as the internet and talking on the phone with peers rather than males [24]. Female students often balance academic expectations with significant domestic responsibilities, rooted in traditional gender roles. This creates a burden that manifest as the high levels of emotional symptoms and hyperactivity.

A significant difference was reported between schools located in urban and rural areas in terms of peer problems and prosocial behavior, while emotional symptoms, conduct problems, and hyperactivity also showed significant differences. Students attending rural schools scored higher for total difficulties compared to those at schools in urban areas because the primary health care centers are often concentrated in urban center. Rural areas tend to have a lack of human resources, infrastructure, and knowledge based on mental health support, with students experiencing mental problems being neglected and discriminated against by the community due to their lifestyles being adapted by culture, religion, and history [25]. The results align with previous research conducted in Cambodia in that people in rural areas find it difficult to access mental support services near their homes, while primary health centers tend to be in urban areas [11]. Students from public schools exhibited a significant difference in mental health status compared to those attending private schools, with the analysis showing a higher abnormal score for public school students. The significant difference factors were found to relate to peer problems and prosocial behavior. A correlation was found between mental and physical activities [26], [27] private school environments, and an infrastructure that provides access for students to have regular exercise and motivation through psychosocial support in school [28].

A significant difference was observed in the factors of emotional symptoms, hyperactivity, peer problems, and prosocial behavior. The study findings suggest that the mother's level of education plays a more critical role in shaping adolescents' mental health than the socioeconomic status of the house. Students whose mothers had lower education levels reported a significantly higher score for total difficulties compared with students whose mothers had an undergraduate degree. Parents' education level, particularly that of the mother, plays an important role in family management, financial stability, and child development by fostering an environment that supports well-being [29]. This finding is deeply rooted in Cambodian culture, where women traditionally fulfill the central role of housewives and primary caregivers. In this context, an educated mother is better equipped to foster a supportive home environment and navigate children development challenges, acting a vital protective factor against psychological distress.

In comparing socioeconomic status, no significant differences in mental health were observed across the groups. Socioeconomic status is widely recognized as a predictor of mental health in many studies across the Southeast Asia region [14], [30], [31]. Typically, lower socioeconomic status is associated with poorer mental health due to financial problems and the accessibility of food. Cambodia, being marked by the historical trauma of war and limited mental care, involves more complex factors compared to other ASEAN member states [11]. The results contrast with previous research on Vietnamese adolescents, demonstrating that socioeconomic status significantly associates mental health and is fundamental to providing them with a healthy lifestyle and well-being [32].

These findings have direct implications for future public health and educational policy in Cambodia. The high prevalence of abnormal mental health among female students (50.56%) necessitates urgent action. The data points to an urgent for school-based mental health programs that are gender-responsive and specifically address the unique pressures faced by female students. Additionally, there is a clear requirement for decentralization of services to bridge the "access-gap" in rural areas. Given the traditional role of Cambodian women as primary caregivers and managers of the home, the finding that maternal education is a more potent protective factor than socioeconomic status pivotal. By focusing on empowering women through health literacy, Cambodia can foster supportive home environment and national school curriculum that improve student well-being. Ultimately, this empirical foundation will support the nation's long term economic development and academic achievement.

5. CONCLUSION

This study provides clear evidence that socio-demographic factors, specifically gender, school location, school type, and mother's education, are critical influences on mental health status of secondary school students in Cambodia. Notably, gender and maternal education emerged as the primary determinants of psychological well-being, with over 50% of female students and those whose mothers had only elementary education reporting abnormal mental health status. Based on these findings, policy interventions must move toward gender-responsive school program, such as peer mentorship groups that leverage the existing social network where female students primarily seek support. Furthermore, given that maternal education was more potent protective factor than socioeconomic status, community-based initiatives should prioritize maternal health literacy to empower mothers as central emotional regulators in the home. In addition, decentralizing mental health services to rural areas is essential to bridge the "access-gap" and reduce the cultural stigma currently faced by rural students.

Future research should employ longitudinal designs to track how these sociodemographic influences evolve as students transition into higher education or the professional workforce. There is also a significant need for qualitative investigations involving in-depth interviews with mothers and educators to better understand the specific cultural mechanisms that allow maternal education to mitigate psychological distress in low-resource environments. This study has several limitations that should be acknowledged. First, the cross-sectional design restricts the ability to establish causal and various socio-demographic factors. Additionally, self-reported dietary intake can be subject to recall bias since student may not accurately answer, especially on socioeconomic question.

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C : **C**onceptualization

M : **M**ethodology

So : **S**oftware

Va : **V**alidation

Fo : **F**ormal analysis

I : **I**nterpretation

R : **R**esources

D : **D**ata Curation

O : **O**riginal Draft

E : **E**diting

Vi : **V**isualization

Su : **S**upervision

P : **P**roject administration

Fu : **F**unding acquisition

CONFLICT OF INTEREST STATEMENT

No potential conflict of interest was reported by the authors.

ETHICAL APPROVAL

Ethical approval for this study was obtained from Ministry of Education, Youth and Sport (MoEYS), Cambodia, as part of the Physical Health Education Joint-Research Work under the Memorandum of Cooperation signed on March 16, 2021. Additional ethical clearance was granted by the Aichi University of Education, Jana, under its institutional review policy. Permission for data collection was obtained from Ministry of Education, Youth and Sports, Cambodia.

DATA AVAILABILITY

The data that support the findings of this study are available on request from the corresponding author. The data, which contain information that could compromise the privacy of research participants, are not publicly available due to certain restrictions.

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APPENDIX

Table 4. Association between mental health and mother's education level and socioeconomic status by one-way ANOVA

	Classification		S. Square	d.f	Mean Square	F-value	p-value
Mother's education	Emotional Symptoms	Between group	74.153	4	12.359	5.601	0.000
		Within groups	3356.032	1523	2.206		
		Total	3430.186	1527			
	Conduct Problem	Between group	14.323	4	2.387	1.063	0.383
		Within groups	3415.863	1523	2.246		
		Total	3430.186	1527			
	Hyperactivity	Between group	43.482	4	7.247	3.255	0.003
		Within groups	3386.704	1523	2.227		
		Total	3430.186	1527			
	Peer Problem	Between group	41.554	4	6.926	3.109	0.005
		Within groups	3388.632	1523	2.228		
		Total	3430.186	1527			
	Prosocial behavior	Between group	51.365	4	8.561	3.854	0.001
		Within groups	3378.821	1523	2.221		
		Total	3430.186	1527			
Socioeconomic status	Emotional Symptoms	Between group	3.442	2	.574	0.819	0.555
		Within groups	1064.866	1525	.700		
		Total	1068.308	1527			
	Conduct Problem	Between group	7.262	2	1.210	1.735	0.109
		Within groups	1061.046	1525	.698		
		Total	1068.308	1527			
	Hyperactivity	Between group	3.551	2	.592	0.845	0.535
		Within groups	1064.758	1525	.700		
		Total	1068.308	1527			
	Peer Problem	Between group	7.733	2	1.289	1.848	0.086
		Within groups	1060.576	1525	.697		
		Total	1068.308	1527			
	Prosocial behavior	Between group	3.549	2	.592	0.845	0.535
		Within groups	1064.759	1525	.700		
		Total	1068.308	1527			

Note: Partial eta square (η_p^2) for significant ANOVA results ranged from 0.008 to 0.015, indicating a small effect size.

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