

## Mental health of adolescents in Myanmar: A systematic review of prevalence, determinants and interventions

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### ABSTRACT

Adolescence is a developmental phase where mental disorders typically manifest and where platforms for response (including schools and health services) change rapidly. However, data to inform public mental health responses are limited, including in countries like Myanmar which has a large adolescent population and where mental health has been identified as a priority of policy. In this paper we sought to systematically review the peer-reviewed and grey literature to determine (i) the prevalence of mental disorder among adolescents in Myanmar, (ii) determinants of mental disorder and (iii) interventions that have been implemented and evaluated. Nine publications met inclusion criteria (7 peer-reviewed and 2 grey literature) that included 7 publications reporting prevalence, 6 reporting correlates and one an intervention. The available data from the 2016 Global School-based Health Survey highlight that depression (27.2%) and suicidal ideation (9.4%) are prevalent in Myanmar, and these rates are substantially higher than regional averages. The limited available data on correlates identified violence and bullying, alcohol and substance use, and home, family and community security and cohesion as being closely related to mental health for adolescents. Only one study focussed on interventions and this found mindfulness meditation training to be an effective approach for young people whose parents were affected by HIV. These findings underscore the need to address adolescent mental health in Myanmar, but also to invest in better data collection efforts.

### 1. Introduction

Mental health is a key driver of health, wellbeing and socioeconomic development, yet until recently, it has remained relatively neglected in

global policy and action (World Health Organisation, 2008). Indeed, mental disorder was only included as key non-communicable disease at the UN's third High-Level Meeting in 2018 (World Health Organisation, 2018b). In this context, depression has emerged as a leading cause of

*Abbreviations:* CI, confidence interval; CTC, communities that care survey; GSHS, Global School-based Student Health Survey; HSCL, Hopkins Symptoms Checklist; PRISMA, preferred reporting items for systematic and meta-analyses; RCT, randomised control trial; WHO, World Health Organization.

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**Box 1**

Inclusion and exclusion criteria for vetting of search results, with rationale.

	Criterion	Rationale
<b>Inclusion</b>	English language publications	Expert collaborators in Myanmar advised that academic outputs in-country are published in English.
	Concerning a population between the ages of 10 and 24 years	This age range captures the WHO definition of <i>adolescent</i> (10–19 years) and also the overlapping definition of <i>young person</i> (15–24 years). It is to be consistent with the policy direction of the Government Myanmar (the Five-Year National Strategic Plan for Young People’s Health [10–24 years]).
	Myanmar residents	Mental health data for adolescents in Myanmar has not yet been reviewed.
	Focuses on mental health or mental illness	Our focus is on mental disorder as this aligns with the targets of mental health service responses and policy action.
	In the last 15 years	We sought records over a time interval to the present to elucidate any recent changes in mental health data.
<b>Exclusion</b>	Studies published prior to 2005	Mental health has been a more recent focus of research and policy. We sought up-to-date records.
	Marginalised sub-populations	This review sought conclusions that are likely to be generalisable to the wider adolescent population in Myanmar.
	Population non-resident in Myanmar	As for marginalised sub-populations.

disease burden globally, with suicide emerging as a leading cause of mortality amongst young people in many settings (World Health Organisation, 2013a, 2020a), with suicidal behaviours more prevalent in females than in males and peaking around 15 years of age (Kang et al., 2015; Husky et al., 2012; McKinnon et al., 2016)

There are good reasons to bring a sharp focus to young people within a public health approach to mental health. Adolescence is a developmental stage where mental disorders typically manifest (Patton et al., 2016). It is a life phase where platforms for response (including schools and health services) change rapidly. Improvements to the mental health of current adolescents also bears a triple dividend: improved quality of life now, reduced burden of disease and enhanced earning potential in the future, and positive impacts on the health of the next generation (Patton et al., 2016).

Efforts to address mental health must be context-specific given wide variation in its conceptualisation, as well as resources available to respond (World Health Organisation, 2013b). Exemplifying this diversity is Myanmar, a South-East Asian country of almost 60 million people, comprised of 135 distinct ethnic groups (Nordic Institute of Asian Studies, 2007). Myanmar has undergone rapid socioeconomic and political development over the past decade and mental health has emerged as a particular issue of policy relevance (Parmar et al., 2015). This is particularly so for adolescents (10–24-year-olds account for a third of Myanmar’s population), with the Myanmar government recognising adolescent mental health as a specific focus of its Five-year National Strategic Plan for Young People’s Health (2016–2020) (Ministry of Health Myanmar, 2016).

**Box 2**

Search syntax conducted on Ovid platform databases (Medline, EMBASE, PsycInfo). The same terms had syntax adjusted to search academic databases using non-Ovid platforms (Web of Science, CINAHL).

<b>Outcomes</b>	<i>(depression or anxiety* or panic or post-trauma* or post-traum* or personality disorder or mood disorder or bipolar disorder or mania or psychotic or psychosis or schizophrenia*).mp.</i> OR <i>((mental* or psych*) AND (ill* or disorder)).mp.</i> AND
<b>Setting</b>	<i>(myanmar or burma or burmese or myanmari or myanmarese).mp.</i> AND
<b>Population</b>	<i>(adolescen* or child* or boy* or girl* or teen* or young pe* or youth or young adult or emerging adult).mp.</i>

**Box 3**

Literature search and retrieval platforms.

**Peer-reviewed literature sources**

- Medline
  - EMBASE
  - PsycInfo
  - Web of Science
  - CINAHL
- Searched with terms per Box 2.

**Grey literature sources**

- OpenGrey
  - WHO websites
  - UNICEF websites
- Searched with terms: Myanmar, adolescent, youth, child, children, paediatric, mental health, psychiatry, psychology, psychological, social determinants
- Eldis
- From the provided drop-down menus: Country: Myanmar Topic: Children and Young People Keywords: mental health, psychology, psychiatry

Whilst adolescent mental health is now a focus of many policies, a barrier to effective action has been the lack of epidemiological data for adolescents, essential to understanding needs and targets for intervention. Global coverage of sufficient-quality and comparable mental health data for children and adolescents is only 6.7%, and less than 4.5% for Southeast Asia (Erskine et al., 2017). There is even less evidence for action on mental health interventions (Patton et al., 2016). However, there are important initiatives underway that are gathering mental health data for young people. The Global School-based Student Health Survey (GSHS) includes measures of adolescent mental health in Myanmar, with data sets from 2007 and 2016 available (World Health Organisation, 2020b). There are also a number of other population-based surveys underway for young people in the Asia-Pacific region (Erskine et al., 2017; World Health Organisation, 2017). Aside from a regional report on some findings of the GSHS, these data have not as yet been systematically analysed or synthesised so as to be accessible to policy makers and programmers.

In this paper we aimed to systematically review the available literature to establish (i) the prevalence of mental disorder among adolescents in Myanmar, (ii) correlates (or determinants) of mental disorder and (iii) interventions that have been implemented and evaluated. We focus our review specifically on mental disorder given this represents the focus of health service-response and policy action.

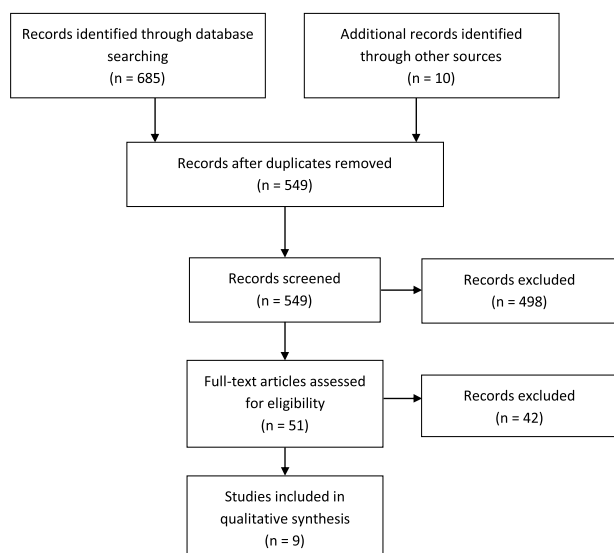


Fig. 1. PRISMA flow diagram of search results and vetting process.

## 2. Methods

We undertook a systematic review of peer-reviewed and grey literature published in the recent 15 years to identify population-based primary studies of mental health among adolescents in Myanmar. For this review, we defined adolescence as corresponding with the age range of 10–24 years. This definition incorporates the WHO definitions of *adolescent* and *young person* and is in keeping with contemporary literature concerning the definition of adolescence (Cini et al., 2021; Sawyer et al., 2018). Box 1 indicates inclusion and exclusion criteria. Our search was in English language given this is the language academic outputs are published in within Myanmar; Burmese speaking co-authors (PW and ZYS) searched local government websites and grey literature in Burmese language and did not identify any additional data. Box 2 indicates the search terms conceptualising mental illness in general terms and common mental disorders, defined by the DSM-5 and ICD-11 (American Psychiatric Association, 2013; Houry et al., 2017). Given the anticipated paucity of data, search terms were intentionally broad. Box 3 indicates databases (peer-reviewed) and websites (grey literature) employed for searches. Searches and appraisal of quality were conducted independently by two co-reviewers (DC and NW). Quality appraisal considered both the sample quality (sample size and representativeness) and quality of measure. Searches were most recently conducted on 1 April 2020. Search results were imported into EndNote X9 (Clarivate Analytics) citation management software and duplicates removed. Titles and abstracts were screened for relevance, with full texts then extracted. Data from included papers were thematically analysed; there was insufficient data for a formal meta-analysis.

## 3. Results

Fig. 1 represents the search results in a PRISMA flow diagram (Liberati et al., 2009). After removal of duplicates, 547 records were returned. Nine records met the criteria, seven being peer-reviewed papers and two being WHO documents. With respect to prevalence, two WHO documents, and four peer-reviewed papers were all based around

GSHS (Table 1). One additional study reported prevalence using the 10-item Hopkins Symptoms Checklist (HSCL-10). Six peer-reviewed papers reported correlates (4 of these also reporting prevalence) and one reported an intervention. These papers were all assessed to be of sufficient quality for inclusion in this review. Whilst Lee (Lee et al., 2018) utilised a small convenience sample, this was for the purpose of qualitative research to understand determinants and was included.

Table A1 lists 27 peer-reviewed concerning neighbouring countries, regional data, or subsets of the population within Myanmar such as refugees. Whilst these papers did not meet specific inclusion criteria for this review, they are presented in summary given they include additional data of interest. These studies were not assessed for quality.

### 3.1. Prevalence

Table 1 summarises prevalence of mental disorder amongst adolescents in Myanmar available from six publications, with details of mental health measures used shown in Table A1 (Appendix A).

#### 3.1.1. Mental distress

Aye and colleagues (Aye et al., 2020) reported that the prevalence of distress was 13.7% amongst 899 young people aged 18–29 years sampled from Yangon. The prevalence for females (17.5%) was higher than for males (9.5%). This study used the HSCL-10 that measures responses on a 4-point Likert-type scale for items: feeling panicky, anxious, dizzy, tense, sleepless, sad, worthless, hopeless, fault within self and finding everything a burden. This tool has been validated in Norway and Pakistan, and the Cronbach  $\alpha$  measure of internal consistency of 0.85 for this population was similar for that of Pakistan (UCLA Institute for Digital Research and Education, 2020).

#### 3.1.2. Depression

Data for depression was available from the GSHS. The key indicator for depression in the GSHS questionnaire is the item: *In the last 12 months, have you ever felt so bad or hopeless that you stopped doing your usual activities for  $\geq 2$  weeks?* GSHS data for Myanmar was gathered in 2007 and 2016. In terms of WHO publications, the 2018 Report of the 2016 data is available but only a Fact Sheet for the 2007 data is available. These do not consistently report prevalence data in the same age groups.

From the 2016 GSHS data, WHO reports the prevalence of depression in 13–17-year-olds as 27.2%. This, as WHO's most recent depression estimate is not directly comparable with their earlier estimate of 15% in 13–15-year-olds from the 2007 Fact Sheet due to the difference in reported age range (the WHO's report of the 2016 GSHS data does not further break down depression prevalence by age group). However, Murshid gives an estimate of 26% from the 2007 GSHS data in the 13–17 age group, indicating a small increase in prevalence (Murshid, 2017; World Health Organisation, 2018a).

#### 3.1.3. Suicidal ideation

The 2007 GSHS Fact Sheet reported 0.7% (95% CI 0.3–1.1) of 13–15-year-olds had suicidal ideation in the preceding 12 months. Suicidal ideation has increased markedly over time according to the GSHS data from 2016 which estimates the current prevalence of suicidal ideation at 9.2% and suicide attempt as 8.4% (World Health Organisation, 2018a). The comparable data for ages 13–15 years across both WHO documents is used.

**Table 1**  
Prevalence data reported in studies that include general populations of adolescents within Myanmar.

Author, Year	Study Type	Target Population (Sample size)	Mental Health Items	Prevalence by age in years, % (95% CI)			
				13–15	16–17	13–17	18–29
WHO, 2018	Cross-section survey, 2016 GSHS Data	In-school adolescents (2,838)	Depression symptoms	–	–	27.2 (-)	–
			Anxiety	–	–	3.9 (-)	–
			Suicidal ideation	9.2 (7.0–12.0)	10.9 (7.7–15.1)	9.4 (7.5–11.8)	–
			Made a suicide plan	–	–	6.8 (-)	–
			Attempted suicide	8.4 (6.4–10.9)	11.2 (8.4–14.7)	8.8 (7–11.1)	–
			Felt lonely	8.3 (-)	11.2 (-)	8.7 (-)	–
			Has no close friends	3.6 (2.7–4.8)	4.4 (3.5–5.6)	3.7 (2.9–4.7)	–
			Alcohol use	3.9 (2.7–5.7)	9.3 (6.4–13.3)	4.7 (3.4–6.5)	–
			Lifetime drunkenness	3.0 (2.1–4.2)	8.0 (5.3–11.8)	3.7 (2.8–5.0)	–
			Bullied	–	–	50.1 (-)	–
			Physically attacked	–	–	32.7 (-)	–
			In a physical fight	–	–	24.3 (-)	–
			Depression symptoms	15 (-)	–	–	–
			Anxiety	1.8 (-)	–	–	–
WHO, 2007	Cross-section survey, 2007 GSHS Data ( <i>Fact Sheet and Summary Table</i> )	In-school adolescents (2806 <sup>c</sup> )	Suicidal ideation	0.7 (0.3–1.1)	–	–	–
			Felt lonely	3.8 (2.1–5.5)	–	–	–
			Has no close friends	3.5 (1.2–4.7)	–	–	–
			Depression symptoms	–	–	16.5 (-)	–
Balogun, 2014 <sup>a</sup>	Alcohol consumption & psychological distress, 2007 GSHS	In-school adolescents (2804)	Anxiety <sup>b</sup>	–	–	36.0 (-)	–
			Alcohol use	–	–	1.6 (-)	–
			Lifetime drunkenness	–	–	3.0 (-)	–
Murshid, 2017 <sup>a</sup>	Bullying victimisation & mental health, 2007 GSHS	In-school adolescents (1747)	Depression symptoms	–	–	26 (-)	–
			Bullied	–	–	36 (-)	–
Njunju, 2017	Associations of suicidal ideation, 2007 GSHS	In-school adolescents (2806)	Anxiety	–	–	2.2 (-)	–
			Suicidal ideation	–	–	1.1 (-)	–
			Lonely	–	–	4.2 (-)	–
			Has no close friends	–	–	3.7 (-)	–
			Consumed alcohol	–	–	1.4 (-)	–
			Abused alcohol	–	–	2.6 (-)	–
			Smoked cigarettes	–	–	2.9 (-)	–
			Bullied	–	–	23.1 (-)	–
			Physically attacked	–	–	23.1 (-)	–
			In a physical fight	–	–	15.9 (-)	–
			Truancy	–	–	21.8 (-)	–
Aye, 2020 <sup>d</sup>	Association of education level & mental distress, HSCL-10	Community in Yangon (899)	Food security	–	–	3.3 (-)	–
			Mental distress	–	–	–	13.7 (-)

- or (-) = Not reported.

<sup>a</sup> Multi-country study with data on Myanmar extracted.

<sup>b</sup> Any exposure reported including from rarely to always.

<sup>c</sup> Students in whole sample; only 13–15yo reported in *Fact Sheet*.

<sup>d</sup> Data for 18–29 years extracted from whole sample of  $n = 2391$ , 18–49 years, prevalence for this age bracket calculated from data extracted from paper.

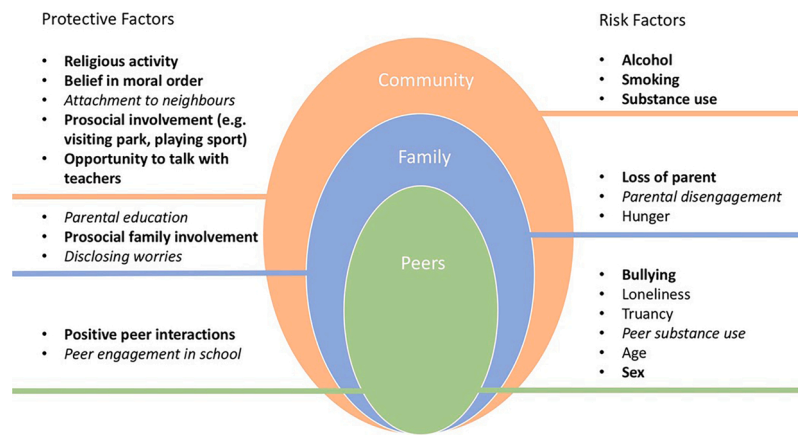


Fig. 2. Associations or correlates of mental health outcomes from peer-reviewed literature. Bold indicates strong evidence, italics indicates moderate evidence, and plain text indicates some evidence.

### 3.1.4. Anxiety

The GSHS uses worry to the point of sleeplessness in the previous 12-month period as a measure for anxiety, using a 4-point Likert-type scale ranging from 1 = never to 5 = always. WHO's reported prevalence among 13–17-year-olds of 4% in 2016 (World Health Organisation, 2018a) can't be directly compared to their 2007 *Fact Sheet* prevalence of 1.8% due to its reporting of a different age range (13–15 years) (World Health Organisation, 2007).

Balogun (Balogun et al., 2014) has re-coded the Likert-type scale responses for anxiety in their analysis, where 0 = never, and 1 = (rarely OR sometimes OR most of the time OR always). This explains the large discrepancy in Balogun's given prevalence for anxiety (36%).

## 3.2. Determinants

Six publications considered associations with poor mental health and these were grouped into domains of community, family, and peer factors, which have been represented in Fig. 2.

### 3.2.1. Alcohol and substance use

Alcohol and substance use were the most commonly investigated correlates for poor mental health, including suicidal ideation (Balogun et al., 2014; Kliewer et al., 2019; Njunju et al., 2017; World Health Organisation, 2018a). A strong correlation was reported by Njunju and WHO.

Kliewer (Kliewer et al., 2019) utilised the *Communities That Care Survey* to determine factors that modulate the risk of substance abuse among school-going adolescents in Myanmar. These included biological sex, family attachments, involvement, and homelife, prosocial behaviours and peer relationships.

### 3.2.2. Anxiety and depression

Anxiety was the second-greatest risk factor for suicidal ideation according to Njunju, with a reported unadjusted odds ratio of 3.43 (Njunju et al., 2017). Aye's study (Aye et al., 2020) was not specific to adolescents (mean age  $33 \pm 9$  years, 95% CI), but included adolescents. Identified determinants of mental distress included pregnancy, being

separated or divorced, and lower educational levels. While adolescent boys not in school reported lower levels of mental distress than boys in school, this was reversed for men over 40 with fewer school years, indicating a possible benefit of schooling in earlier life towards mental health as an adult of parenting age.

### 3.2.3. Bullying and violence

Murshid (Murshid, 2017) reported the association between being bullied at least once in the past 30 days and depression symptoms with an adjusted prevalence ratio (APR) of 2.4. As a foreseeable result of bullying, they reported truancy as a correlate of poor mental health. Bullying and other peer factors such as fighting, loneliness and truancy were corroborated as correlates of negative mental health outcomes by Njunju (Njunju et al., 2017).

WHO (World Health Organisation, 2018a), reported the prevalence of bullying at 50.1%. Reports of violence have increased since 2007 (World Health Organisation, 2018a) and include being in a physical fight with a peer (14.6% in 2007 to 24.3% in 2016) and being physically attacked by someone other than a peer (20.8% in 2007 to 32.7% in 2016).

Lee (Lee et al., 2018) reported on formative qualitative research into the types of mental health symptoms and signs present in a population of young people affected by armed conflict in Kachin state, Myanmar (and as such, not broadly generalisable). Qualitative interviews with adolescents aged 10–17 (mean age 14.7 years) identified symptoms of: sadness, gazing (disconnection), crying, feeling depressed and frightened.

### 3.2.4. Family and community

Differences between the sexes were identified by Kliewer (Kliewer et al., 2019) in family and community protective factors impacting substance use profiles. Belief in the moral order and positive family attachments were significant for males and females, while greater prosocial family involvement, peer involvement, and opportunities to talk with teachers were more significant for males. Another family-associated risk factor for mental health was hunger, reported by Murshid (Murshid, 2017) and Njunju (Njunju et al., 2017).



### 3.3. Interventions

One publication describing an intervention was identified for the studied setting and population. This randomised control trial (RCT) by Mon (Mon et al., 2016) evaluated mindfulness meditation training conducted over eight weekend workshops of two hours each. Control and intervention groups each had 80 participants (Control: 33 male, 47 female, mean age  $12.4 \pm 1.8$ ; Intervention: 37 male, 43 female, mean age  $12.8 \pm 1.9$ ). At six months follow-up, participants were found to have significantly improved scores in the domains of emotional conduct (effect size 1.8) and behavioural conduct (effect size 0.8), measured by a Strengths and Difficulties Questionnaire.

The intervention was specific to adolescents who had a parent either living or deceased who was affected by HIV. Improvement was independent of school attendance. Baseline survey determined maternal orphaning and male sex to be associated with poorer scores for emotional and behavioural conduct, but improved scores were reported for these participants following the intervention.

### 3.4. Non-representative studies

Table B1 (Appendix B) shows 27 peer-reviewed records that included mental health and illness features among adolescents from Myanmar who were affected by geographical or community displacement, or the sampled participants were of a specific sub-population or experiencing specific trauma or disadvantage. These were therefore not included in the collation of prevalence estimates for Myanmar. However, due to their cultural relevance, deterministic elements for mental health identified in these studies were noted and these included: human trafficking, education status, young motherhood in uncertain situations, adverse working conditions, sexual orientation and identity, and separation from home to seek work or higher education.

## 4. Discussion

Mental health data for adolescents in Myanmar are limited, with the GSHS being the primary data source. Data from the 2016 GSHS data show high prevalence estimates for depression (27.2%) and suicidal ideation (9.4%) among adolescents (13–17 years) (World Health Organisation, 2018a). In particular, suicidal ideation has increased markedly in prevalence from 0.7% to 9.2% amongst 13–15-year-olds in the space of less than a decade. These findings underscore the urgent need to address mental health in adolescents in Myanmar. Data on correlates or determinants of mental health in this population are limited but the available studies identify violence and bullying, alcohol and substance use, and home, family and community security and cohesion as being closely related to mental health. Only one study focussed on interventions and this found mindfulness meditation training to be an effective approach in a group of adolescents.

Taking these limitations of data into consideration, the estimates of mental disorder in Myanmar are very high compared to neighbouring countries. Depression in particular appears prevalent with estimates for Myanmar's adolescents (depression, 27.2%) at least five times that of southeast Asian regional estimates (females 5.1%, males 3.8%) (World Health Organization, 2017). Southeast Asia bears the greatest share of global depressive disorder, with 27% of global cases occurring here (World Health Organization, 2017). This stands in contrast to Africa, with 9% of global cases, and Europe, with 12%.

There are several potential drivers for the large burden of poor

mental health amongst adolescents in Myanmar. First, violence and conflict in various contexts is likely to be an important determinant. This review found a high prevalence of physical attacks and fights between peers, as well as bullying (50% prevalence according to 2016 GSHS data). There is also evidence of violence as a determinant of mental trauma in localised conflict affected areas (Lee et al., 2018). Other countries in Southeast Asia, for example Cambodia and Vietnam, also shared similar characteristics and experiences such as traumatic events due to prolonged civil or military conflicts. Previous studies identified several mental health problems including psychological distress, depressive disorder, and post-traumatic stress disorder were prevalent amongst refugee children and adolescents from Cambodia and Vietnam who resettled in the United States (Chung et al., 2000; Kinzie et al., 1989, 1986). Second, community and family factors such as belief in the moral order, prosocial family involvement in the community, prosocial peer activity, and food security were found to be important correlates for mental health. In the context of armed conflict, opportunities for these positive determinants to flourish are seriously impacted by migration or displacement of ethnic groups and fracturing of families and communities, as well as poverty. The third major correlate of mental health was found to be alcohol and substance abuse, which may be a symptom as well as a determinant of poor mental health, influenced by the experience of prior negative determinants.

While reporting and analysis of mental health amongst adolescents in Myanmar may be limited, this does not mean that good data does not exist. The GSHS data sets are of high quality and are expected to be periodically updated. Reanalysis of GSHS data can better elucidate the prevalence of mental disorder and its correlates across adolescence. Risks and effective interventions may vary between ages, and it is possible that intervention in earlier years may prevent the onset of mental disorder in later adolescent years (McGorry and Mei, 2018). As well, important determinants of mental health can be validated via the GSHS data on family and community dynamics and peer interactions. This ongoing survey can then track mental health prevalence and determinants longitudinally.

This review only identified one publication relating to interventions (Mon et al., 2016), which studied subjects affected by parental HIV. The benefit of mindfulness training was assessed by RCT, with positive results. Excluded publications concerning interventions studied displaced, marginalised, and other specifically at-risk groups. There may be valuable data on interventions in these studies that fell outside the scope of this review. Other opportunities to improve mental health may include interventions within school and university systems or strengthening mental health responses in the primary healthcare setting (Patton et al., 2016). WHO's *4-S Framework* is a systematic framework for strengthening health sector responses to adolescent health which has been discussed in the context of other resource-constrained countries and may be applicable to Myanmar (Fisher and Cabral de Mello, 2011; World Health Organisation, 2009).

This review has certain limitations. We necessarily excluded studies on specific sub-populations within Myanmar, and also non-resident Myanmar nationals. Studies of comparable populations from neighbouring countries, and those using aggregated regional data were also excluded. These studies may identify determinants of mental health and evaluate interventions in culturally and demographically similar populations. For this reason, the key features of these studies were reported in Table B1 (Appendix B). We were also unable to adequately explore differences in mental health across age and gender due to the limited reporting of data.

Based on this review, there are several key investments required. First, there is a need to invest in better data collection, including data from different socioeconomic and geographic contexts within Myanmar. While the GSHS provides a good data set, adolescents who are not in school are not captured. Also, data collection should employ measures of mental health that have been validated for the Myanmar adolescent population. Second, reanalysis of GSHS and other data sets can better elucidate mental health correlates and the variations of these between age groups, ethnicities and locations. Third, there is a need for greater investment in responses to mental health outcomes, as evidenced by the high prevalence of mental disorders and their apparent increases in prevalence over time. Interventions should target males and females specifically. Pro-active and preventative interventions targeting school- and university-based adolescents are likely to be effective at a national level. However, reactive interventions focussing on groups that have experienced particular traumas will continue to be necessary, along with continued efforts to curb their causes.

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**Declaration of Competing Interest**

The authors report no declarations of interest.

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**Appendix A**

**Table A1**  
Measures of mental health items pertaining to reported prevalence data in included papers.

Papers	Survey Used	Target Population	Mental Health Items	Measure of Mental Health Item
WHO, 2018, WHO, 2007, Balogun, 2014, Murshid, 2017, Njunju, 2017	GSHS Survey	In-school adolescents	Depression symptoms	During the past 12 months, did you ever feel so sad or hopeless almost every day for two weeks or more in a row that you stopped doing your usual activities?
			Anxiety	During the past 12 months, how often have you been so worried about something that you could not sleep at night?
			Suicidal ideation	During the past 12 months, did you ever seriously consider attempting suicide?
			Made a suicide plan	During the past 12 months, did you make a plan about how you would attempt suicide?
			Attempted suicide	During the past 12 months, how many times did you actually attempt suicide?
			Felt lonely	During the past 12 months, how often have you felt lonely?
			Has no close friends	How many close friends do you have?
			Alcohol use	During the past 30 days, on how many days did you have at least one drink containing alcohol?
			Lifetime drunkenness	During your life, how many times did you drink so much alcohol that you were really drunk? (signs explained: staggering, not being able to speak properly, vomiting)
			Bullied	During the past 30 days, on how many days were you bullied?
			Physically attacked	During the past 12 months, how many times were you physically attacked?
			In a fight	During the past 12 months, how many times were you in a physical fight?
			Abused alcohol	During your life, how many times did you drink so much alcohol that you were really drunk? (signs explained: staggering, not being able to speak properly, vomiting)
			Smoked cigarettes	During the past 30 days, on how many days did you use any form of smoking tobacco?
Aye, 2020	HSCL-10	Community in Yangon (899)	Truancy	During the past 30 days, on how many days did you miss classes or school without permission?
			Food security	During the past 30 days, how often did you go hungry because there was not enough food in your home?
			Mental distress	How much did the following symptoms bother you in the last week, including today? 1. Suddenly scared for no reason 2. Feeling fearful 3. Faintness, dizziness or weakness 4. Feeling tense or keyed up 5. Blaming yourself for things 6. Difficulties in falling asleep or staying asleep 7. Feeling blue 8. Feelings of worthlessness 9. Feeling everything is an effort 10. Feeling hopeless about the future.

## Appendix B

**Table B1**  
Non-representative studies found, by prevalence, determinants, and interventions.

(Reference)	Interest	Region/Country	Target population	Setting	Study type	Sample Size
<b>Prevalence</b>						
(Akiyama et al., 2013)	Trauma, mental health status	Thailand	Students	Boarding houses	Cross-sectional survey	428
(Fellmeth et al., 2018a)	RHS-15 <sup>1</sup>	Thai-Myanmar border	Perinatal women	Refugee camps	Invalidation of screening tool	510
(Fellmeth et al., 2018b)	Migration, PND	Thai-Myanmar border	Perinatal women	Refugee camps	Prospective cohort	116
(Ing et al., 2017)	Post-natal depression	Thai-Myanmar border	Post-natal women	Refugee camps	Validation of EPDS	670
(Shannon et al., 2015a)	Trauma, torture	United States	Karenni refugees	Community	Survey	179
<b>Interventions</b>						
(Annan et al., 2017)	SFP <sup>2</sup>	Thailand	Migrants/Refugees	Community	RCT: Parenting skills	479 families
(Bolton et al., 2014)	Trauma, CETA <sup>3</sup>	Thailand	Refugees	Community	RCT: Treatment	347
(Kowitt et al., 2016)	Trauma therapy	United States	Refugees	Art therapy participants	Treatment evaluation: progressive surveys	9
(Nagoshi et al., 2018)	Substance use intervention	United States	Refugees (mothers)	Community	Pre- and Post-test: parenting skills	14
(Rowe et al., 2017)	Trauma therapy	United States	Refugees	Art therapy participants	Pre- and Post-test: art therapy	30
<b>Determinants</b>						
(Dixit et al., 2018)	Mental health determinants	United States	Refugees	School-based	Qualitative discussion	27
(Fellmeth et al., 2015)	Migration, mental illness	Thai-Myanmar border	Pregnant women	Refugee camps	Qualitative discussion	116
(Fellmeth et al., 2018c)	Migration, PND <sup>4</sup>	Thai-Myanmar border	Perinatal women	Refugee camps	Qualitative discussion	11
(Hnuploy et al., 2019)	Work, home environment	Thailand	Migrant workers	Community	Cross-sectional survey	1022
(Jacob et al., 2020)	Serious physical injury	Global LMICs <sup>5</sup>	Injured adolescents	School-based	GSHS analysis (cross-sectional)	44,333
(Johnston et al., 2017)	Forced sex correlates	Yangon & Monywa, Myanmar	Young MSM <sup>6</sup>	Community	Survey	400
(Kiss et al., 2015)	Suicide risk, trauma	Greater Mekong Region	Survivors of trafficking	Post-trafficking services	Survey	387
(Meyer et al., 2016)	Workplace, security stress	Thai-Myanmar border	Migrant workers	Community	Survey	589
(Peltzer and Pengpid, 2017)	Hunger, psychosocial issues	ASEAN <sup>7</sup> member countries	Adolescents	School-based	GSHS analysis (cross-sectional)	30,197
(Peltzer et al., 2017)	Suicide, childhood abuse	ASEAN member countries	Students	Universities	Cross-sectional survey	4675
(Pocock et al., 2018)	Trafficking	Greater Mekong Region	Trafficked fishermen	Community	Convenience survey; Qualitative	275
(Ranasinghe et al., 2016)	Hygiene	Global LMICs	Adolescents	School-based	GSHS analysis (cross-sectional)	7904
(Saw et al., 2018)	High-risk sex, gender	Myanmar-China border	Methamphetamine users	Community	Cross-sectional survey	1183
(Saw et al., 2016)	Sex trading	Myanmar	Male non-injecting drug users	Community	Cross-sectional survey	210
(Shannon et al., 2015b)	Political trauma	United States	Refugees	Community	Qualitative discussion	111
(Yi et al., 2017a)	Binge drinking	ASEAN member countries	Students	Universities	Cross-sectional survey	8809
(Yi et al., 2017b)	Illicit drug use	ASEAN member countries	Students	Universities	Cross-sectional survey	7923

<sup>1</sup> Refugee Health Screener 15.

<sup>2</sup> Strengthening Families Program.

<sup>3</sup> Common Elements Treatment Approach.

<sup>4</sup> Post-natal Depression.

<sup>5</sup> Low- & Middle-Income Countries.

<sup>6</sup> Men who have Sex with Men.

<sup>7</sup> Association of South-East Asian Nations.



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