

Application of socio-ecological model in developing preventive strategies against suicidal ideation and suicidal attempt among youth in low and middle-income countries: A scoping review

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ABSTRACT

Introduction: Suicide is recognized as an important public health concern, as it is the second leading cause of death among young people. About 80% of all suicide cases occur in low- and middle-income countries (LMICs). Understanding the risk factors for suicidal behaviours among young people in LMIC is important in developing preventive strategies; however, evidence on this is still lacking. Socio-ecological model (SEM) is a suitable framework in explaining the factors of suicidal behaviour. The aim of this review is to identify the factors associated with suicidal ideation and suicidal attempt among young people in LMIC, guided by the SEM model, and eventually develop its preventive strategies.

Materials and methods: This review has two parts. The first part is a scoping review of the factors associated with suicidal ideation and attempt among young people. The search was conducted in Pubmed, Scopus, and PsycInfo. The second part is the development of preventive strategies according to the identified factors. Both parts will be guided by the SEM model.

Results: A total of ten studies with 45,278 participants that matched the criteria are included in this review. The review found that the risk factors for suicidal ideation among young people in LMIC are being female, psychiatric illness, psychology problem, smoking, alcohol intake, victim of abuse, bullied, and food insecurity. The preventive strategies include policy, mental healthcare services, awareness programme, and coping strategies.

Conclusion: More epidemiological studies are needed to evaluate the risk factors of suicide that are unique in LMIC, such as help-seeking behaviour and available mental healthcare services. Suicide prevention requires concerted effort of policymakers, healthcare services, community and individual; thus, SEM framework is suitable as a guidance for suicide prevention.

KEYWORDS:

Suicidal attempt, suicidal ideation, suicide, young people, socio-ecological model

INTRODUCTION

Suicide is recognized as an important public health concern by the World Health Organization (WHO) in its Comprehensive Mental Health Action Plan. Approximately, 800,000 people die from suicide every year and account for 1.4% of all deaths worldwide.¹ About 80% of all suicides occur in low- and middle-income countries (LMICs). Economic variables have been associated with suicidal behaviour.² Poverty was reported to have a positive association with suicide.³ Furthermore, a psychiatric illness which is a common risk factor for suicidal behaviour in high-income countries was reported to have a lower prevalence in LMIC.⁴ Understanding the risk factors for suicidal behaviours in LMIC is important to develop preventive strategies; however, evidence on this is scarce.⁵ While the prevalence of the suicide rate is higher among older people, it is important to note that suicide is the second leading cause of death in youth (aged 24 years and younger). It is also the most frequent cause of death among young females.^{6,7} A population-based study among adolescents in LMIC reported that approximately one in five have suicidal ideation (16.9%) and suicidal attempt (17%).⁸ The same trend was reported in another study among adolescents in 40 LMIC. In addition, the prevalence of suicidal attempt range from 6.7% to 61.2%.⁹ Apart from life loss, these preventable deaths among young people also cause substantial economic losses.¹⁰

Suicidal behaviour is a constellation of symptoms comprising of suicidal ideation, suicidal attempt, and suicide. Suicidal ideation is defined as the “thought of engaging behaviour intended to end one’s life”. A suicide attempt is defined as “engagement in potentially self-injurious behaviour with at least some intent to die”, while suicide is defined as a “fatal self-injurious act with some evidence of intent to die”.¹¹ Generally, psychiatric, psychological,¹² physical, personal, familial, and social were domains associated with suicidal behaviour.¹³ Similarly, among the key risk factors for suicide among youth were mental disorders, specific personality characteristics, genetic, and family processes.¹²⁻¹⁴ Another systematic review found that the socio-family environment and unhealthy behaviour are the factors associated with suicidal behaviours among youth in China.¹⁵ The social-ecological model (SEM) provides a comprehensive framework in explaining the risk factors.¹⁶ SEM describes individuals as a part of a larger social system and the interactive

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characteristic of individuals that underlie health outcomes. The model was then modified and incorporates five levels of influence on health behaviour: intrapersonal factors, interpersonal process and primary groups, institutional factors, community factors, and public policy.¹⁷ In addition, possible intervention strategies according to the levels were also described.¹⁸ The Centre of Disease Prevention and Control has also adopted the SEM Model as a framework for suicide prevention.¹⁹ As SEM is a comprehensive framework in describing suicide preventive strategies, this scoping review will therefore follow SEM framework.

It was estimated that for every suicide, there were 10–20 times suicide attempts. About 74.9% transitioned from ideation to plan and 71.2% transitioned from ideation to attempt.⁷ This shows that there is room for preventive measures. Suicide is an indicator of the Sustainable Development Goal 3.4.2, which is to reduce by one-third premature mortality from non-communicable diseases through enhanced prevention, treatment, and promotion of mental health and well-being. The WHO recommends understanding the pattern of suicide as an important public health action to prevent suicidal behaviour.²⁰ The National Suicide Prevention Strategies also outlines risk factors identification and prevention as approaches that can be taken to change environments, protect people against suicidality and eventually change the behaviour that puts people at risks.²¹ A review by Robinson et al. on youth suicide prevention mentioned that only limited studies were conducted in LMIC.⁵ Two previous reviews that conducted on suicide in LMIC, however did not focused on young people and only focused on economic relationship with suicide.^{3,22} On that account, this review aims to evaluate the factors associated with suicidal ideation and suicidal attempt and its preventive strategies among young people in LMIC according to the SEM model.

MATERIALS AND METHODS

This review has two parts. The first part is a scoping review of the factors associated with suicidal ideation and attempt among young people. The second part is the development of preventive strategies according to the identified factors. Both parts will be guided by the SEM model.

Search strategy

Electronic database searches were done in PubMed, Scopus, and PsycInfo. The search was conducted up to April 2021. Keywords combination of suicide OR suicidal ideation OR suicide attempt AND factors OR determinants OR predictors AND young people OR youth OR student were used for the search. The search was limited to 10 years as to reflect an update on the economic situation.

Studies selection

Articles were selected if they were conducted in LMIC and if they were in the English language. The countries were determined to be as LMIC if they were listed as such by World Bank Data. Studies that assessed risk factors of suicidal ideation and suicidal attempt were included. Studies were included if the population was among young people (aged 10–24 years old). Observational studies including cross-sectional or cohort study design were included. Qualitative studies, reviews, proceedings, and protocols were excluded.

Identified factors were classified according to the SEM model based on the description below:

1. Individual: Characteristics of the individual, including, knowledge, attitude, behaviour, developmental history.
2. Interpersonal: Formal and informal social factors, social support system including family, and friends.
3. Community: Relationship among organizations, institutions, and informal network
4. Societal: Local, state, and national laws and policies.

Data Extraction

The titles and abstracts of the articles retrieved from the databases were searched by one person. Two persons assessed and documented the articles as either include, exclude, or unclear. Full text of the articles that were classified as include or unsure were further assessed according to the eligibility criteria by two persons. Data were extracted from all potential studies and documented in a table. The table includes information on study characteristics (study design, total participants, and study duration), participant characteristics (mean age, gender, and level of education). Factors that reported a significant ($p < 0.05$) adjusted estimates (odds ratio (OR)) were also recorded.

RESULTS

Search results

Based on three electronic databases searches, 1760 articles were identified. A total of 312 duplicate articles were removed, and a further 1395 articles were excluded following titles and abstracts screening. Fifty-three full-text articles were assessed for eligibility, of which 43 articles were removed.

Characteristics of studies

A total of 10 studies with 45,278 participants that matched the criteria are included in this review.^{23–32} Two studies were conducted in Brazil.^{23,25} While other studies were conducted in Mozambique,²⁶ Ethiopia,³¹ Ghana,²⁹ Nepal,²⁸ sub-Saharan Africa,²⁴ Iran,²⁷ Bangladesh³², and Malaysia,³⁰ respectively. All studies were cross-sectional study design. The percentage of female in the study ranged from 45% to 60%. Table I shows the details of the characteristics of the studies.

Factors of suicidal ideation and suicidal attempt

The risk factors for suicidal ideation and suicidal attempt are categorized according to SEM. For personal level, the factors are demography, psychiatric, psychology, and substance abuse. For interpersonal level, the factors are abuse in home or school, and social support or close friends. The only factor identified for societal level is food insecurity. The factors associated with suicidal ideation and suicidal attempt is described in Figure 1.

Individual Demographic

The only contradictory finding is the gender risk on suicidal behaviour. Some of the studies reported male possess higher risk, while others reported female,^{23–25,28–30} with the highest odds reported of aOR 5.12 (95% CI 3.32, 7.89). In terms of ethnicity, only one study showed significant odds of suicidal ideation in between ethnicity in Malaysia.³⁰

Table 1: Characteristics of Studies and Factors of Suicidal Ideation and Suicidal Attempt

Study	Country	Study design	Total sample size	Female (%)	Suicidal Ideation	Suicidal Ideation
Seidu et al., 2020	Mozambique	Cross-sectional	1918	N/A	Anxiety, having close friends, peer support, current smoker, experienced hunger, bullied, fight, attack, injury, truancy	Anxiety, having close friends, current smoker, experienced hunger, bullied, fight, attack, injury, parental understanding
Amare et al., 2018	Ethiopia	Cross-sectional	573	51.7	Absenteeism, felt lonely or sad and hopeless, poor social support, disappointed with school results, physically hurt	Living alone, absenteeism, loneliness, and feelings of hopeless and sadness, sleep disturbance, being physically hurt, poor social support
Asante et al., 2017	Ghana	Cross-sectional	1984	45.7	Male, anxiety, loneliness, truancy, bullied, attacked, in a fight, food insecurity	Anxiety, truancy, bullied, attacked, in a fight, food insecurity, parental understanding
Pandey et al., 2019	Nepal	Cross-sectional	6,531	N/A	Female, anxiety, loneliness, initiation of drug use, food insecurity	Female, anxiety, loneliness, having close friends, truancy, current smoker, and bullied
Ahmad et al., 2014	Malaysia	Cross-sectional	25,174	50.4	Female, Chinese, and Indian ethnicity, parental divorce/widow, stress, depression, anxiety, current smoker or drinkers, bullied, physically or verbally abuse at home, close friends	Not measured
Sharma et al., 2015	Brazil	Cross-sectional	916	53.6	Female, perceived unhappiness, smoking, in fight, insulted, attacked, sexual intercourse initiation	Female, perceived unhappiness, alcohol consumption, illicit drug use, in fight, insulted, attacked
Silva et al., 2014	Brazil	Cross-sectional	2207	62.1	Female, violent behaviour, cigarette smoking, alcohol consumption	Female, violent behaviour, cigarette smoking, alcohol consumption
Ziaei et al., 2017	Iran	Cross-sectional	1517	52.1	Smoking, ideation to use alcohol or other drugs, sexually abuse, being worried that you could not eat or did not feel hungry	Not measured
Mamun et al., 2020	Bangladesh	Cross-sectional	665	32.5	Separated/divorced, social media addiction, depression, anxiety, stress	Not measured
Shayo et al., 2019	Sub-Saharan Africa	Cross-sectional	3,793	52.1	Loneliness, anxiety, food insecurity, parental care	Loneliness, anxiety, food insecurity

Table II: Preventive Strategies according to Socio-ecological Framework

Level	Preventive Strategies
Individual	Awareness of mental disorders and substance abuse, self-help strategies on managing stress
Interpersonal	Home: Awareness programs among parents School: Awareness program among teachers and students, gatekeeper, peer leadership, skills training, screening, or assessment
Community	Training of healthcare providers and usage of artificial intelligence for prompt identification of suicidal behaviour and management of mental disorders
Societal	Policy making for food security Awareness programme among public

Psychiatric and psychology

Psychiatric disorders that were reported to have associated with suicidal ideation and suicidal attempt among young people are depression and anxiety. Higher odds of getting suicidal ideation among those who have anxiety were reported in four studies,^{26,28-30} with the highest odds of 2.54 (95% CI 1.49, 4.30). While, the risk of having suicidal attempts among young people having depression was only reported in one study (aOR 2.25, 95% CI 1.97, 2.58).³⁰

In terms of psychology, hopelessness was found to have been associated with suicidal ideation and attempt in one study.³¹ In another study, adolescents who perceived unhappiness have a higher risk of having suicidal ideation or attempt.²⁵

Substance use

Substance use such as smoking, alcohol intake, and drug were associated with an increased risk of having suicidal ideation and attempt.^{23,25,26,28,30} Young people who are smokers have three times higher risk of getting suicidal ideation (aOR 3.00, 95% CI 1.69, 5.30)²⁷ and attempt (aOR 3.13, 95% CI 1.36, 7.23).²⁸

Interpersonal abuse

Seven studies found that young people who gets abuse either physically, verbally, or sexually abuse at school or home has been associated with an increased risk of suicidal behaviour. Among those, sexual abuse had the highest odd (aOR 2.63, 95% CI 1.32, 5.24) of having suicidal intention.²⁷ In another study, young people who are physically hurt are four times more likely to have suicide attempt (95% CI 1.77, 10.20).³¹

Social support/close friends/loneliness

Young people with a good support system or having close friends are protective factors for both suicidal ideation and attempt.^{33,34} Young people with close friends have lower risk of suicidal ideation (aOR 0.694, 95% CI 0.496, 0.971) and suicidal attempt (aOR 0.529, 95% CI 0.384, 0.729).²⁶

Truancy

Another risk factors for suicidal behaviour among young people is truancy or absenteeism.^{26,28,29,31}

Societal food security

At the society level, food security has been associated with an increased risk of having suicidal ideation or attempt in four studies.^{24,26,28,29} The risk of having suicidal ideation was reported to be aOR 1.56 (95% CI 1.09, 2.23), while a suicidal attempt was aOR 1.48 (95% CI 1.05, 2.09).²⁹

DISCUSSION

The aim of this review is to identify the factors associated with suicidal ideation and attempt among young people in LMIC according to the SEM model and recommend the preventive strategies. The review found that the risk factors for suicidal ideation among young people in LMIC are being female, having psychiatric illness, or psychology problem, smoking or alcohol intake, being an abuse victim or bullied and experienced food insecurity. Whereas the protective factors are having good social support and close friend. Similar findings were reported in other reviews of factors of suicidal behaviour among young people.^{13,15,35-37}

Risk factors

The factors for suicidal behaviour among young people in LMIC reported in this review are not distinctive from the common factors of suicidal behaviours. This could be contributed by lack of evaluation of socio-economic factors. Poor socio-economic status was identified as one of the important factors associated with suicidal behaviour.^{38,39} Finding reveals suicide rates increase with unemployment, low income, and low housing quality. Another review also reported that although socio-economic position such as asset, education, and financial difficulty is associated with suicidal behaviours, however, findings are severely limited.²² In addition, the socio-economic factors could moderate the existing factors which can cause a higher weightage on the suicide risk. Variables such as education, food insecurity, housing, socio-economic possess a strong association with mental disorders, thus, increase suicide behaviour.^{40,41} In another example, the environmental factor associated with low income, may precipitate violence or abuse, thus increase the risk of suicidal behaviour.⁴² Furthermore, another important factor which is mental health resources was also not studied. Mental health services problems in LMICs include a lack of budget and overburdened systems.⁴³

Individual

Individual risk factors for suicidal ideation and attempt are psychiatric illnesses (anxiety, depression), psychology (stress, sleep disturbances), and substance abuse (smoking, drug, alcohol). Similar findings were reported in a meta-analysis, whereby 45% (95% CI 30% - 61%) of those who engaged in non-fatal suicidal behaviour in LMIC have a psychiatric disorder. The most prevalent disorder reported was mood disorder.⁴ In another study, a significant direct relationship was found between baseline anxiety with suicidal ideation.⁴⁴ As for psychological factors, communication difficulties, decision-making impulsivity, and aggression were found to be significant risk factors for suicide attempts.¹²

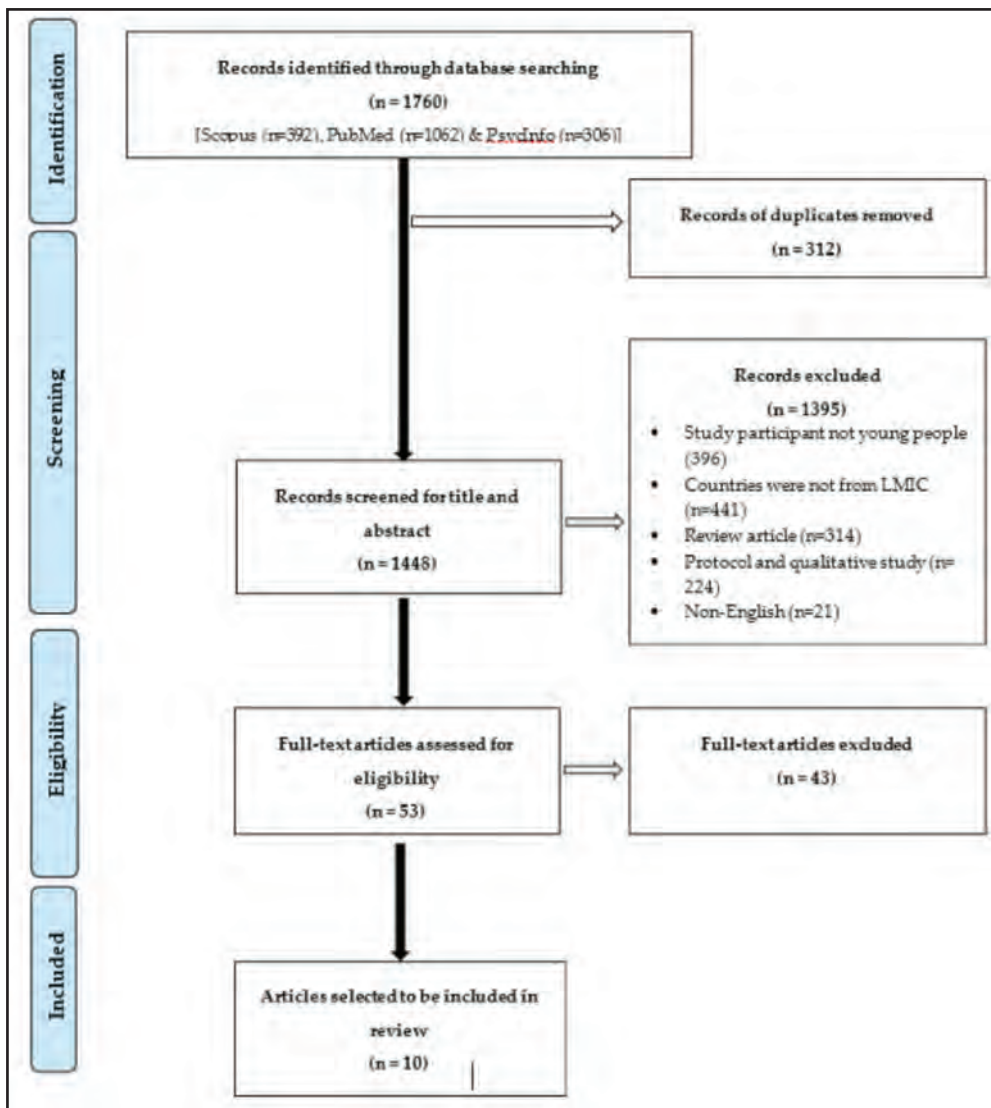


Fig. 1: PRISMA Flowchart

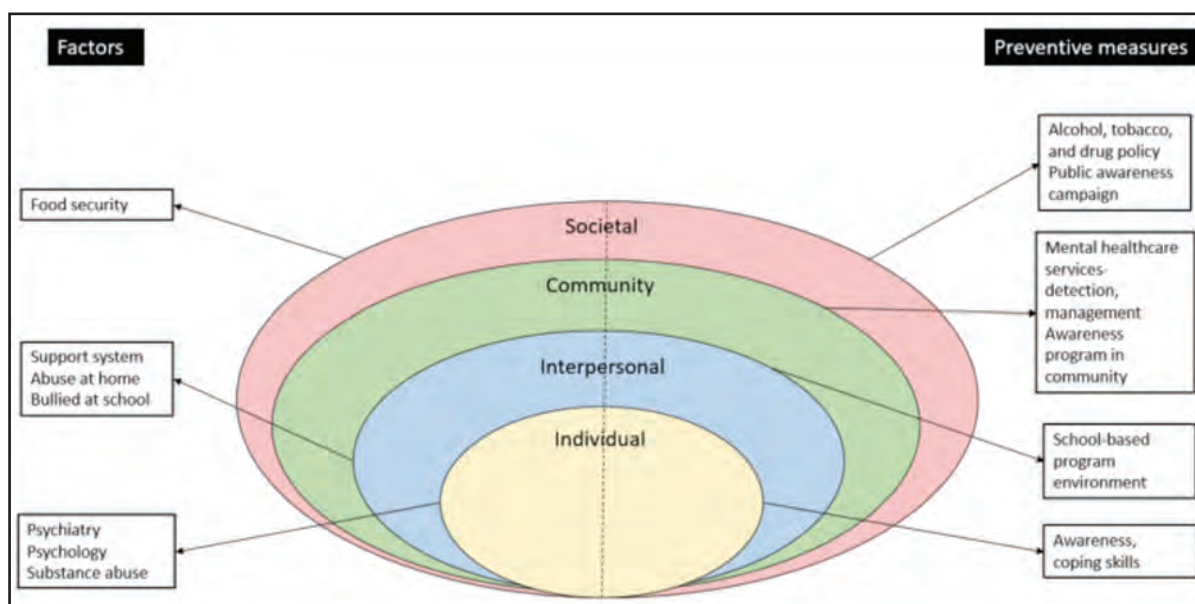


Fig. 2: Factors associated with suicidal behaviour and the preventive measures according to SEM framework

The only contradictory finding is the gender risk. Difference factors lead to suicidal behaviour between the gender. Internalizing emotional and behavioural problems leads to female suicidal behaviour such as eating disorder, post-traumatic stress disorder, bipolar disorder, being victim of dating violence, depressive symptoms, and history of abortion. While externalizing emotional and behavioural problem leads to male suicidal behaviour such as disruptive behaviour, hopelessness, parental separation, friend's suicidal behaviour, and access to lethal means.

Interpersonal

Main risk factor for interpersonal level is abuse and bully, consistent with previous findings.⁴⁵ Both violent and non-violent forms contributed to the increased risk of suicidal ideation.⁴⁶ A significant relationship was reported between adverse childhood experience with suicidality.⁴⁷ In terms of the type of abuse, sexual, physical, emotional, and neglect were all associated with suicidal attempts.⁴⁸ In contrast, those who have good social support includes having a close friend are protective factors of suicidal ideation and attempt. Similar findings were reported, whereby lower support, accounting for parent and friend independently predicted suicidal attempt.^{34,49} In another study, negative relationship quality with parents predicted suicidal ideation even with parents who had no history of suicidal ideation.⁵⁰ Other than school and house settings, a meta-analysis reported that cyberbullying was more strongly related to suicidal ideation compared to traditional bullying.⁵¹ None of the included studies assessed different types of bullying, thus it is unknown if cyberbullying is one of the risk factors. However, one of the studies reported that social media addiction is one of the risk factors for suicidal ideation.

Community

The SEM framework for community level examines the settings such as schools, and neighbourhoods, where social relationship occurs and seeks to identify the characteristics of these settings. The factors leading to suicide at community level may be exposure to community violence, or high crime levels, local drug trade, or barriers to healthcare access. Unfortunately, none of the studies included have assessed these variables. Although most of the studies had large study participants, however, as most of them used data from Global School-based Student Health Survey (GSHS), thus, the variables are the same.

Societal

At societal level, only food insecurity was found to be the risk factor for suicidal behaviour. This could be explained by food insecurity be associated with poorer psychological well-being or mental health and sleep health.^{52–54} A cross-sectional study of food security with suicide attempts among adolescents reported similar findings. However, the association was similar despite the difference in the income level of the countries.⁵⁵

Preventive strategies

Preventive programmes are designed to identify vulnerable groups and improve the assessment and care of people with suicidal behaviour. Among the preventive measures taken were restricting access to lethal means, school-based

awareness programs, lithium and clozapine use, and psychotherapeutic effort for depression.⁵⁶ National Suicide Preventive Programs that have been conducted in some countries have been proven effective.⁵⁷ However, the strongest effects of preventive strategies were seen in groups aged 25 to 44 years old and 45 to 64 years old.⁵⁷ The scope of suicide prevention among young people for this review covers the spans of primary and secondary prevention based on the SEM framework.

In view of similar factors, the recommended preventive strategies for LMIC are also general. However, LMIC must focus on strengthening of the strategies. This is because, evidence of the intermediate effectiveness of suicide preventive programme such as mental health literacy is still poor compared to high-income countries.^{58,59} Poor mental health literacy will then lead to low help-seeking rate.⁶⁰ In addition, lack of access to or services for mental healthcare in these countries may increase suicidal behaviour.⁶¹ Among the challenges that mental healthcare services in LMIC face are legislation and policy, resources, and availability of evidenced-based intervention.⁶² Figure 2 summarizes the risk factors and the preventive measures according to the SEM framework.

Individual

The primary prevention for individual level may include awareness of mental disorders and substance abuse, and self-help strategies on managing stress. However, the effectiveness of this awareness programme is not available.⁶³ This is mainly due to the unavailability of the outcome measured. Most studies measured the intermediate outcome, which is an increase in knowledge and attitude. In view of an increase in knowledge and attitude may not represent changes in behaviour, the true reduction in the suicide rate is not available.⁶⁴

Interpersonal

Primary prevention for the interpersonal level may include awareness programmes among parents and teachers. School is an ideal setting for a suicide prevention program, in view of truancy of absenteeism is associated with suicidal ideation. Previous school programme for suicide includes education and awareness, gatekeeper, peer leadership, skills training, and screening or assessment.^{64,71} In a study of cyberbullying victimization and suicidal ideation, school connectedness was found to be moderating bullied victim with suicidal ideation.⁷² Thus, it is worthwhile to strengthen interventions in school.

Community

Prompt identification and management of mental disorders are warranted for secondary prevention at the individual level. Accordingly, the training of healthcare providers in detecting suicidal behaviour has been proven effective.⁶⁵ Recently, the use of artificial intelligence (AI) has been getting attention in the detection of suicide, either medically or socially.^{66,67} In terms of management of mental disorders for suicide prevention, the review has shown a reduction in suicidal rate with the usage of Lithium, a mood stabilizer. Psychotherapy, particularly cognitive behavioural therapy (CBT) and dialectical behavioural therapy has also been

shown promising for the management of depression and anxiety.⁶⁸⁻⁷⁰ Computerized CBT (cCBT) could be an alternative suicide preventive method among youth. In view of youth are generation ubiquitous with digital usage, online psychotherapy and AI through the social platform may be helpful.

Societal

The prevention strategies at societal level for food insecurities requires policy making especially at school level. This may include food programme at school for low-income students.⁷³ Awareness programme among public may also be beneficial. A study on the effect of public awareness campaigns on suicide showed reduction in the number of suicide following the intervention.⁷⁴ Table II summarizes the preventive strategies according to SEM framework.

LIMITATION

Although this review aims to focus on the factors associated with suicidal ideation and attempt exclusive in LMIC. However, the factors from the studies did not evaluate economic factors such as low family income, low educational level, or access to healthcare which may be the contributing factors for these countries. Thus, the review recommends that more studies focus on the factors associated with poverty and suicidal behaviour specific for LMIC. This is crucial in developing a well-informed suicide prevention strategy tailored to socio-economic context.

All studies were conducted in school setting. In addition, most of the studies used data from GSHS, thus the data were abundance and comparable. However, this causes studies to have similar results, although located in different sites. All studies were cross-sectional study design, thus causal inferences are not possible. In view of this is a scoping review, the search is not exhaustive. Furthermore, meta-analysis is not conducted which might limit the strength of evidence of the factors.

CONCLUSION

The factors associated with suicidal ideation and suicidal attempt are multifactorial, including psychological and psychiatric. These factors are also interconnected and can be explained by the SEM. Thus, the suicidal prevention strategies must take into consideration social, economic, and cultural factors. It needs a concerted effort from political such as smoking and alcohol policy for underage, ascertainment of food security, organization such as school and healthcare providers, and community.

CONFLICT OF INTEREST

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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