



# Mental disorders and suicidality among Opioid Agonist Treatment service users in Nepal: A cross sectional study



Sagun Ballav Pant<sup>a,c,\*</sup>, Suraj Bahadur Thapa<sup>a,c,f</sup>, John Howard<sup>b</sup>, Saroj Prasad Ojha<sup>c</sup>, Lars Lien<sup>d,e</sup>

<sup>a</sup> Division of Mental Health and Addiction, Institute of Clinical Medicine, University of Oslo, Norway

<sup>b</sup> National Drug and Alcohol Research Centre, Faculty of Medicine, University of New South Wales, Australia

<sup>c</sup> Department of Psychiatry, Institute of Medicine, Tribhuvan University, Kathmandu, Nepal

<sup>d</sup> National Advisory Unit on Concurrent Substance Abuse and Mental Health Disorders, Innlandet Hospital Trust, Hamar, Norway

<sup>e</sup> Faculty of Social and Health Sciences, Inland Norway University of Applied Sciences, P.O. Box 400, NO-2418 Elverum, Norway

<sup>f</sup> Division of Mental Health and Addiction, Oslo University Hospital, Norway

## ARTICLE INFO

### Keywords:

Opioid agonist treatment (OAT)  
Major depressive disorder  
Suicidality  
Nepal

## ABSTRACT

**Background:** High lifetime prevalence of major mental disorders and suicidality are common among Opioid Agonist Treatment (OAT) service users and impact on the outcomes of OAT programs. Despite the known detrimental effects across personal, social and economic aspects of life these associations and implications remain under-studied in resource poor settings. The aim of this study was to identify common mental disorders among OAT service users in Kathmandu valley and to explore factors associated with lifetime suicidality and major depressive disorder.

**Methods:** A cross-sectional study was conducted among 231 participants from five OAT centers in the Kathmandu valley. Participants were administered a semi-structured questionnaire, the Nepalese version of the Kessler 6 Psychological Distress Scale (K6), and the Mini International Neuropsychiatric Interview (M.I.N.I.) 7.0.2. Bivariate and multivariate analyses were employed to identify associations between lifetime suicidality and lifetime major depressive disorder with socio-demographic variables, other mental disorders, and substance use related variables.

**Results:** Among OAT service users, 16.5% reported a history of mental disorder and one in four had a Kessler-6 psychological distress score  $\geq 13$  within the last four weeks. Using M.I.N.I. lifetime suicidality was observed in 26.0% and lifetime major depressive disorder in 24.2%. Lifetime suicidality were significantly higher among participants with lifetime psychotic disorder (AOR = 5.94; 95% CI:1.66, 21.34,  $p = 0.006$ ), lifetime antisocial personality disorder (AOR = 2.60; 95% CI:1.0, 6.71,  $p = 0.049$ ) and having a Kessler-6 score  $\geq 13$  (AOR = 2.45; 95% CI:1.13, 5.29,  $p = 0.023$ ). Lifetime major depressive disorder was independently associated with a Kessler-6 score  $\geq 13$  (AOR = 5.38; 95% CI:2.49, 11.62,  $p < 0.001$ ).

**Conclusion:** This study revealed a high prevalence of mental disorders and lifetime suicidality among OAT service users. Reviewing initial screening and assessment protocols for OAT, and routine use of brief screening tools to ensure better identification of those at risk is warranted, including suicidality risk assessment.

## 1. Background/Introduction

Globally, about 284 million people aged 15–64 used psychoactive substance at least once in 2020, and around 61 million used opioids for non-medical reasons. The number of people who died due to drug use in 2019 was almost half a million (64% opioid related), while drug use disorders resulted in 18 million years of healthy life lost. This has

significant social and economic impacts for individuals, families, communities and nations (UNODC, 2022). According to the Nepal Drug Users Survey, 2020, out of the 130,424 people who use drugs, 46.8% used opioids. (Ministry of Home Affairs, 2022).

The Diagnostic and statistical Manual of Mental Disorders (DSM-5) diagnosis of Opioid use disorder (OUD) requires a “problematic pattern of opioid use leading to clinically significant impairment in a 12-month

\* Corresponding author. Division of Mental Health and Addiction, Institute of Clinical Medicine, University of Oslo, Norway.

E-mail addresses: [sagun055@gmail.com](mailto:sagun055@gmail.com), [pants@uio.no](mailto:pants@uio.no) (S.B. Pant).

<https://doi.org/10.1016/j.ssmh.2022.100165>

Received 21 August 2022; Received in revised form 6 October 2022; Accepted 11 October 2022

Available online 18 October 2022

2666-5603/© 2022 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

period” (American Psychiatric Association, 2013). Opioid agonist treatment (OAT) is an evidence-informed treatment modality which is defined as “the administration of thoroughly evaluated opioid agonists, by accredited professionals, in the framework of recognized medical practice, to people with opioid dependence, for achieving defined treatment aims” (World Health Organization, 2009). People with OUD, especially those in or suitable for OAT, face a range of adverse health effects with subsequent significant morbidity and mortality, more so when poly-substance use is involved. These include lower quality of life, stigma, discrimination, poor physical health, blood-borne infections such as HIV, Hepatitis-C (HCV) and high lifetime prevalence of comorbid psychiatric disorders including major depressive disorder, anxiety disorder, suicidality and psychosis (Aas et al., 2020; Kidd et al., 2018; Reduction International, 2020; Lamont et al., 2020; Morin et al., 2020; UNODC, 2022; Vold et al., 2022).

High lifetime prevalence of mental disorders and suicidality in persons with OUD and in OAT has been reported in studies from developed and developing nations in which depressive disorder, anxiety disorder and suicidality are the most common co-morbid presentations (Iskandar et al., 2013; Kermodé et al., 2020; Vold et al., 2022; Zhang et al., 2016; Zhong et al., 2019). Studies have consistently found that OAT is effective in improving the mental health outcome among service users (Moazen-Zadeh et al., 2021).

Nepal was the first country to introduce OAT in South-Asia. The first pilot project closed abruptly in 2002 after which OAT was restarted in 2007 (Ambekar et al., 2013). However, despite being available for many years there is insufficient coverage, uneven distribution of OAT services as well as access barriers to other harm reduction services such as needle and syringe programmes (Reduction International, 2020). OAT programmes in poor resource settings, such as Nepal are led by non-specialist medical practitioners, often in partnership with Non-Governmental Organizations (NGO) and groups of people who use/used drugs (PUD), but with few trained mental health specialists such as psychiatrists or addiction specialists (Rao et al., 2013). This can lead to lack of timely diagnosis of common mental disorders which can affect the overall outcome of OAT including early drop out, abuse of street drugs, indulgence in high-risk behaviors including injecting and sexual behaviors and untimely death due to suicide and drug overdose.

To our knowledge, no prior study has explored mental disorders including suicidality using structured diagnostic inventory among OAT service users in Nepal. The present study aimed:

1. To identify common mental disorders among service users receiving OAT across five centers in Kathmandu valley.
2. To explore associations between lifetime suicidality and lifetime major depressive disorder with demographic characteristics, and substance use related variables and other mental disorders.

## 2. Methods

### 2.1. Study participants

This was a cross-sectional study among 231 OAT service users (213 males and 18 females) at two government hospital-based and three community-based NGO run OAT sites in Kathmandu valley. Participants were recruited from the OAT site at Tribhuvan University Teaching Hospital and Saarathi-Nepal located in Kathmandu district, Sparsha-Nepal and Patan Mental Hospital located in Lalitpur district and Aavash-Samuha in Bhaktapur. Data were collected over a period of 8 months from January 2021 to August 2021.

The inclusion criteria included service users receiving OAT for opioid use disorder and aged between 18 and 60 years. Those in the first two weeks of enrollment into OAT or with any organic mental disorders such as dementia, delirium and amnesic syndromes were excluded.

Required sample size was calculated by using single population proportion formula for finite population (Daniel and Cross, 2013). Required

minimum sample size ( $n$ ) =  $\frac{[z^2p(1-p)/e^2]}{[1 + \{z^2p(1-p)/e^2N\}]}$

During the start of the study, there were a total of 477 service users across five sites in Kathmandu. Using a proportion ( $p$ ) of 0.5, margin of error ( $e$ ) of 0.05 and level of confidence measure ( $Z^2$ ) as 1.96 (for 95% confidence level), the necessary minimum sample size ( $n$ ) was 214.

Considering a non-response rate of 15%, 247 service users were identified across five OAT centers in Kathmandu valley. The total sample was proportionately selected from each five OAT site based on the number of service users across each center. Each participant was selected randomly using computer generated random numbers. We were able to recruit 231 (93.5%) of total sample

### 2.2. Study procedures and instruments

Service users of OAT sites who agreed to participate in the study were provided in-detail information about the study and its implications. Informed written consent was obtained from each participant, and approval for the study from the OAT sites. A weekly schedule of interview for service users selected for the study was made in advance and confirmation of timing for interview was done a day before the planned interview. All face-to-face interviews were done in a quiet and comfortable room at OAT sites where the recruited study participants were interviewed using a structured questionnaire.

The survey instruments were: a questionnaire covering socio-demographic and other background characteristics, the Kessler-6 psychological distresses scale (K6), and Mini International Neuropsychiatric Interview (M.I.N.I.). M.I.N.I. was administered by a psychiatrist trained by the developer of the tool. Service users with diagnosis of common mental disorders were referred to the Department of Psychiatry at the Institute of Medicine, Tribhuvan University Teaching hospital (TUTH) for management purpose. The research team made arrangement for early appointment and they were also provided 24-hour operated telephone numbers of ‘TUTH- mental health crisis line’ and ‘TUTH- suicide prevention helpline’ operated by the Department of Psychiatry, Institute of Medicine, TUTH.

#### 2.2.1. Socio-demographic questionnaire

The socio-demographic section included age, gender, educational qualification, occupation, marital status, medical co-morbidities and family structure. Medical co-morbidities included non-communicable diseases like tuberculosis, diabetes mellitus, hypertension and blood borne infections like HIV, Viral hepatitis (B and C), injection related inflammation and abscess. Socio-economic status (SES) was assessed using the modified Kuppaswamy's scale (Joshi and Acharya, 2019). SES was dichotomized as ‘Upper’ which included upper and upper middle SES and ‘Lower’ which included lower middle, upper lower and lower SES. Mental disorder related information included past history of any mental disorder diagnosed by a psychiatrist, psychologist or a trained mental health professional. Questions on substance use related behavior included a history of poly substance use, injectable drug use in the past and previous attempts to quit substance use.

#### 2.2.2. Kessler-6 psychological distresses scale (K6)

Psychological distress was assessed using the Kessler-6 psychological distress scale (K6), a six-item standardized scale, quick and easy to use tool. The K6 has been used to screens for psychological distress and a means of identifying risk for serious psychological distress over last four weeks (Kessler et al., 2003; Pratt, 2009). The self-administered version of K6 has been translated into Nepali language (Harvard Medical School, 2005) and has been used previously in Nepal (Gyawali et al., 2016; Panthee et al., 2014, 2020). Then Nepali version previously used demonstrated acceptable internal consistency with alpha coefficient of 0.83 (Pyakuryal et al., 2011). The six items cover feeling nervous, hopeless, restless or fidgety, so depressed that nothing could cheer up, that everything was an effort and feeling worthless. Each item has a 5-points rating scale from zero (none of the time) to four (all of the time).

Total scores of 0–12 indicate not having serious psychological distress, and 13–24 as probably having serious psychological distress, indicative of a serious mental disorder, with a sensitivity of 0.36 and specificity of 0.96 (Kessler et al., 2003).

### 2.2.3. Mini International Neuropsychiatric Interview (M.I.N.I.)

Lifetime and current mental disorders and suicidality were assessed using the Mini International Neuropsychiatric Interview (M.I.N.I.) The M.I.N.I. is a widely used brief structured diagnostic interview for the major psychiatric disorders. It has a good reliability and validity compared to other standard structured interviews used in mental health (Sheehan et al., 1998). The standard M.I.N.I. has been translated to more than 70 languages and assesses the 17 most common mental disorders (Sheehan, 2016). Common mental disorder in this study refers to major depressive disorder, suicidality, manic and hypomanic episodes, panic disorder, agoraphobia, social anxiety disorder, obsessive compulsive disorder, post-traumatic stress disorder, alcohol use disorder, psychotic disorder, generalized anxiety disorder and antisocial personality disorder. M.I.N.I. version 7.0.2 has also been translated into Nepali, adapted and was used in the National Mental Health Survey Nepal (Dahal et al., 2020; Dhimal et al., 2022; Jha et al., 2019). The Nepalese version has demonstrated good internal consistency for a number of the most common disorders (Dahal et al., 2020). Permission to use the Nepali version of M.I.N.I. was obtained from the developer prior to the study.

The outcome variables in our study were lifetime suicidality and lifetime major depressive disorder. Lifetime major depressive disorder was defined as having at least one lifetime major depressive episode (current or past) without manic, hypomanic or other specified bipolar and related disorders. Lifetime suicidality in our study refers to suicidality among those with a lifetime suicide attempt. Those with lifetime suicidality in M.I.N.I. are further categorized as low (1–8 points), moderate (9–16 points) and high ( $\geq 17$  points) risk based on sum of scores obtained in the suicidality module.

The suicidality module included an in-depth interview with 19 questions answered as *yes* and *no*. Each positive response (*yes*) has corresponding points which are summed at the end of the module. The interview included questions on passive death wishes (1 point), thought of self-harm with awareness of possible death (6 points), voices/dreams of suicidal content (4 points), suicidal plans in last months (8 points). Active steps to prepare for suicide but not starting the attempt, aborted active step and interrupted active step were scored 9, 10 and 11 points respectively. Similarly, for suicidal attempt, aborted attempt, interrupted attempt and going through the attempt completely as meant to was scored 12, 13 and 14 points respectively. A history of lifetime suicide attempt and likelihood of suicide attempt in the next 3 months were scored 4 and 14 points respectively (Sheehan, 2016).

### 2.3. Statistical analysis

The collected data were analyzed using Statistical software for data science (STATA) version 17 for statistical analyses. Mean and standard deviations (SD) for continuous variables and frequencies and percentages for categorical variables were used as descriptive statistics. Pearson's chi square ( $\chi^2$ ) test was computed to observe association of categorical variables.

Logistic regression models were used to explore the association between socio-demographic and other characteristics with lifetime suicidality and lifetime major depressive disorder. Bivariate analyses were first done followed by multivariate logistic regression to check if socio-demographic variables, mental disorders and substance use related behaviors had statistically significant association in predicting lifetime suicidality and major depressive disorder. Variables found to be statistically significant in bivariate model with a p-value  $< 0.25$  were entered in the final model along with other relevant variables. Adjustment was undertaken for variables-age, co-morbid medical conditions, self-reported history of any mental disorder, previous attempt to quit

substance use, poly substance use, lifetime anti-social personality disorder, lifetime psychotic disorder, socio-economic status, history of injectable drug use, and K6 score. Analyses were conducted to rule out multicollinearity. The statistical significance was considered at p-value  $< 0.05$  and 95% confidence intervals (CIs).

## 3. Results

### 3.1. Socio-demographic and other characteristics of the OAT service users

Table 1 provides the socio-demographic and other characteristics of the 231 OAT service users. The mean age of OAT service users was 33.8 years (SD 7.3), and only eighteen (7.8%) were female. Of the total service users, 154 (66.7%) had secondary level education, 174 (75.3%) were employed and 128 (55.4%) were married. Almost half (46.8%) had co-morbid medical conditions. Co-morbid medical conditions included non-communicable diseases such as tuberculosis, diabetes mellitus, hypertension, blood borne infections like HIV, Viral hepatitis (B and C) and injection related thrombosis and abscess. A history of mental disorder was self-reported by 38 (16.5%).

At least one previous attempt to abstain from substance use was reported by 137 (59.3%) service users, 127(55%) had a history of poly substance use and 118(51.1%) had past injection use behavior. Regarding the SES, 124 (53.7%) belonged to upper middle SES. The K6 found that 56 (24.2%) had a score  $\geq 13$ , suggesting some form of serious psychological distress with in the last four weeks.

**Table 1**  
Socio-demographic and other characteristics of the OAT service users.

Variables (N = 231)	Frequency (n)	Percentage (%)
<b>Age (in years) (Mean <math>\pm</math> S.D)</b>	33.80 $\pm$ 7.30	
<b>Sex</b>		
Male	213	92.2
Female	18	7.8
<b>Education Level</b>		
Primary and lower	23	10.0
Secondary	154	66.7
University	54	23.3
<b>Occupation</b>		
Unemployed	57	24.7
Employed	174	75.3
<b>Marital Status</b>		
Unmarried	80	34.6
Married	128	55.4
Separated/divorced	23	10.0
<b>Co-morbid medical conditions</b>		
Yes	108	46.8
No	123	53.2
<b>Family structure</b>		
Nuclear	119	51.5
Extended	112	48.5
<b>Socio economic status</b>		
Upper ( $\geq$ Upper middle)	124	53.7
Lower ( $\leq$ Lower middle)	107	43.6
<b>History of any mental disorder (self-reported)</b>		
Yes	38	16.5
No	193	83.5
<b>Previous attempt to quit substance use</b>		
Yes	137	59.3
No	94	40.7
<b>History of poly substance use</b>		
Yes	127	55.0
No	104	45.0
<b>Injection drug use in past</b>		
Yes	118	51.1
No	113	48.9
<b>Kessler -6 Psychological distress scale</b>		
Score $\geq 13$	56	24.2
Score $< 13$	175	75.8

### 3.2. Prevalence of mental disorders among the OAT service users

Table 2 presents the prevalence mental disorders identified via the M.I.N.I. Among OAT service users, lifetime suicidality was observed in 60 (26%) and lifetime major depressive disorder in 56 (24.2%). Current major depressive disorder was diagnosed in 15 (6.5%), current suicidality in 31 (13.4%), and 43 (18.6%) had alcohol use disorder for the past 12 months. Post-traumatic stress disorder was diagnosed in 10 (4.3%), lifetime psychotic disorder in 17 (7.4%), generalized anxiety disorder in 18(7.8%) and lifetime antisocial personality disorder in 27 (11.7%).

### 3.3. Suicidality related characteristic among the OAT service users with lifetime suicide attempt

Table 3 summarizes suicidality related characteristic among OAT service users with lifetime suicide attempt. Among the 60 OAT service users with lifetime suicidality, 36 (60%) reported 1–2 lifetime suicide attempts, and 24 (40%) more than two lifetime suicide attempts. Although, about one-fourth of the service users (23.3%) were found to have high risk of suicidality, a large majority (80%) made their last suicide attempt more than 24 months ago.

### 3.4. Factors associated with lifetime suicidality and major depressive disorder among the OAT service users

Table 4 describe the unadjusted and adjusted odds ratios for factors associated with lifetime suicidality and major depressive disorder among participants. Lifetime antisocial personality disorder (AOR = 2.60; 95% CI:1.0, 6.71,  $p = 0.049$ ), lifetime psychotic disorder (AOR = 5.94; 95% CI:1.66, 21.34,  $p = 0.006$ ) and K6 score  $\geq 13$  in the past four weeks (AOR = 2.45; 95% CI:1.13, 5.29,  $p = 0.023$ ) were found to have significant association with lifetime suicidality in the multivariate logistic regression.

OAT service users having history of mental disorder (AOR = 4.20; 95% CI:1.74, 10.15,  $p = 0.001$ ) and having serious psychological distress in the past 4 weeks (AOR = 5.38; 95% CI:2.49, 11.62,  $p < 0.001$ ) were significantly associated with lifetime major depressive disorder in multivariate model.

## 4. Discussion

To the best of our knowledge, this is one of the first study assessing the prevalence of common mental disorders and factors associated with lifetime suicidality and major depressive disorder among OAT service users in Nepal.

**Table 2**

Prevalence of Mental disorders among the OAT service users.

Mental disorder (N = 231)	Frequency (n)	Percentage (%)
Major Depressive Disorder, current	15	6.5
Major Depressive Disorder, Lifetime	56	24.2
Suicidality current (Past month)	31	13.4
Suicidality lifetime attempt	60	26.0
Bipolar Disorder, current	1	0.4
Bipolar I Disorder, past	7	3.0
Bipolar II Disorder, past	2	0.9
Panic Disorder, current	6	2.6
Panic Disorder, lifetime	16	6.9
Agoraphobia, current	5	2.2
Social Anxiety Disorder, current	4	1.7
Obsessive Compulsive Disorder, current	6	2.6
Post-Traumatic Stress Disorder	10	4.3
Alcohol use disorder, past 12 months	43	18.6
Lifetime psychotic disorder	17	7.4
Substance medication induced psychotic disorder	9	3.9
Generalized anxiety disorder, current	18	7.8
Antisocial personality disorder, lifetime	27	11.7

**Table 3**

Lifetime Suicidality related characteristic among OST clients with lifetime suicide attempt.

Characteristics (N = 60)	Frequency (n)	Percentage (%)
<b>Number of lifetime suicide attempt</b>		
1-2 attempts	36	60.0
3-4 attempts	14	23.3
>5 attempts	10	16.7
<b>Suicide risk score</b>		
Low (1–8)	41	68.4
Mod (9–16)	5	8.3
High ( $\geq 17$ )	14	23.3
<b>Last suicide attempt</b>		
Within the past 12 months	9	15.0
Between 12 and 24 months	3	5.0
More than 24 months ago	48	80.0

Our study revealed high prevalence of common mental disorders among OAT service users. Serious psychological distress in the last four weeks was found in about one-in four OAT service users. The prevalence of lifetime major depressive disorder and level of suicidality in our study was much higher than self-reported history of any mental disorder (16.5%). This suggests that OAT service users may not have been aware of their current and past mental health status which might be due to the paucity of mental health literacy and access to service barriers.

Prevalence of almost all of the mental disorders assessed in our study were much higher than those identified in the recent population-based mental health survey in Nepal (Dhimal et al., 2022; Jha et al., 2019). On the other hand, the prevalence rates of depressive disorder and combined anxiety disorder in our study were substantially lower than the prevalence rates reported in another nationwide study in Nepal (Risali et al., 2016). Likewise, studies of OAT service users in China, India and Indonesia found higher rates of depression and anxiety when compared to our findings (Iskandar et al., 2013; Kermodie et al., 2020; Zhang et al., 2016; Zhong et al., 2019). The differences may be impacted by the variety of scales utilized. The burden of suicidality among OAT service users has long been overlooked in a Nepal.

However, this study found a substantial burden of current and lifetime suicidality, with 40% making more than two suicide attempts, which can impact on morbidity and mortality in an already vulnerable high-risk group. Studies from different countries including both well and low resourced settings have documented sizeable prevalence of suicidal ideation and attempts among OAT service users (Armstrong et al., 2013; Comiskey and Cox, 2010; Cottler et al., 2005; Kermodie et al., 2020; Rosic et al., 2020; Vold et al., 2022; Zhong et al., 2019). Lifetime suicidality among OAT service users in our study is slightly less than OAT service users in China (Zhong et al., 2019) and India (Armstrong et al., 2013; Kermodie et al., 2020), but slightly higher compared to OAT service users in Taiwan (Chen et al., 2010). However, when comparing to general population in Nepal, lifetime suicidality among OAT service users is much higher (Dhimal et al., 2022; Jha et al., 2019).

The OAT service users in the current study reporting a lifetime psychotic disorder and antisocial personality disorder and a K6 score  $\geq 13$  was more likely to experience lifetime suicidality. Previous studies also indicate high K6 scores are associated with increased probability of suicidal behaviors (Ko and Harrington, 2016; Naito et al., 2021; Tanji et al., 2018). A similar study in China also found a significant association between lifetime suicide attempt and antisocial personality disorder, but unlike our study, also showed associations with age, gender, education, economic status, route of opioid use, duration of OAT use, dose of OAT medication and anxiety symptoms (Zhong et al., 2019). In addition, a K6 score  $\geq 13$  was associated with lifetime major depressive disorder in our study. The utility of K6 has been well established in predicting depression and major depressive episode across settings (Chan and Fung, 2014; Ferro, 2019; Khan et al., 2019).

Antisocial personality disorder was observed in 11.7% of service users, which is higher than the general population but less compared to

**Table 4**

Factors associated with lifetime suicidality and major depressive disorder among OAT service users.

Variables (N = 231)	Lifetime suicidality		Lifetime depression	
	Unadjusted OR 95% CI (LB, UB)	Adjusted OR 95% CI (LB, UB)	Unadjusted OR 95% CI (LB, UB)	Adjusted OR 95% CI (LB, UB)
Age (in years)	1.03 (0.99,1.07)	1.02 (0.98,1.08)	1.03 (0.20,1.1)	1.04 (0.98,1.1)
Co-morbid medical conditions (vs no)	2.49 (1.36, 4.57) **	1.16 (0.53,2.53)	1.73 (0.95,3.19)	0.81 (0.36,1.82)
History of any mental disorder (vs no)	4.25 (2.06,8.78) ***	2.30 (0.92,5.79)	7.43 (3.50,15.75) ***	4.20 (1.74,10.15) **
Previous attempt to abstain (vs no)	2.576 (1.33,4.97) *	1.67 (0.77,3.63)	2.01 (1.04,3.86) *	1.61 (0.73,3.55)
Poly substance use (vs no)	2.95 (1.53,5.56) **	1.82 (0.65,5.13)	2.53 (1.32,4.85) **	2.20 (0.76,6.32)
Antisocial personality disorder (vs no)	3.70 (1.624,8.43) **	2.60 (1.0,6.71) *	1.67 (0.70,3.96)	0.95 (0.34,2.67)
Lifetime psychotic disorder (vs no)	8.3 (2.77,24.73) ***	5.94 (1.66,21.34) **	3.10 (1.13,8.40) *	0.95 (0.25,3.56)
Upper SES (vs Lower)	0.62 (0.345,1.13)	0.52 (0.25,1.08)	1.20 (0.66,2.20)	1.18 (0.56,2.50)
IDU in past (vs no)	2.91 (1.55,5.47) **	0.97 (0.33,2.83)	2.04 (1.10,3.80) *	0.75 (0.25,2.25)
K6 score $\geq 13$ (vs < 13)	4.45 (2.34,8.55) ***	2.45 (1.13,5.29) *	7.44 (3.78,14.62) ***	5.38 (2.49,11.62) ***

Footnote. OR = odds ratio, CI= Confidence interval, LB = Lower bound, UB= Upper bound, IDU= Injectable drug use K6= Kessler –6 Psychological distress scale, SES = socio-economic status, \*p < 0.05 \*\*p < 0.01 \*\*\*p < 0.001.

other studies (Zhong et al., 2014). Having an antisocial personality disorder has been associated with increased risk of opioid use (Wojcickowski, 2021). In addition, alcohol use disorder among OAT service users was also higher in comparison to general population, but was in line with other OAT studies (Dhimal et al., 2022; Michel et al., 2015; Nepal et al., 2022; Padmanathan et al., 2022).

As among OAT service users in many countries, females were under-represented in this study, and mean age was lower than studies in more developed settings. (Padmanathan et al., 2022; Rosic et al., 2020; Vold et al., 2022). Poor social and family support, cultural perception about women using substance, stigma, and institutional and personal barriers are believed to be major reasons for women not accessing treatment services (Lal et al., 2015). A better understanding of the youthfulness of OAT service users in Nepal is warranted.

Most OAT service users were employed and as the study was undertaken in the capital city of Nepal, the SES of more than half were upper middle SES. Despite being relatively young population, about 47.8% had some medical co-morbidities. Similar observation of increased medical co-morbidity with early age of opioid use has been reported in Canada (Naji et al., 2017).

The findings of our study have several implications to improve timely detection and management of mental disorders among OAT service users. As K6 scores were associated with both lifetime suicidality and major depressive disorder, the K6 could be an easy and convenient tool to screen for psychological disorders and suicidal behavior/ideation in OAT services. Likewise, other brief tools such as the Beck Depression Inventory-II and the Hopkins Symptom Checklist-10 that measure psychological distress have been used with people with alcohol use disorder (Lien et al., 2022). In addition, the recently developed Quick Screening Tool developed in Vietnam for use in the community with hard-to-reach people who inject drugs (PWID) has the added advantage of questions on suicidality and psychosis while remaining short (5–10 min to administer). It was assessed as helpful, relevant and easy to use by community-based organisation staff, and acceptable to PWID (Le et al., 2022).

In resource-limited OAT settings, such as Nepal, OAT services are mostly led by trained non-specialist doctors in partnership with community-based organizations, with a scarcity of psychiatrists and clinical psychologists. Using available, brief and easy to use screening tools to identify those with potentially serious mental health concerns, including suicidality, and refer for detailed assessment and treatment that may not be available in OAT services. Developing and sustaining effective links to accessible, appropriate comprehensive mental health assessment and treatment is essential, as are psychosocial supports and access to education, training, employment, and opportunities for pro-social interactions, and family-focused interventions. Likewise, there is a need to improve mental health literacy among OAT service users, and better understand symptoms of common mental disorder including suicidality and communicate with service providers about their mental

distress.

#### 4.1. Limitation and strength

Our study has some limitations. First, causal relationship between independent and dependent variables cannot be inferred due to the design of the study i.e., cross sectional in nature. Second, recall bias cannot be completely ignored as some of the questions depended on subjective memory of the OAT service users. Likewise, some variables are 'self-report' and thus unable to be verified. Third, the use of OAT sites located in Kathmandu valley as the site of participant recruitment might have created sampling bias. Moreover, those who declined to participate may contrast from those who participated and thus the study is unable to assess the degree to which the participants were representative of the broader OAT service user group; nonetheless, response rate of 93.5% suggests the sample is representative.

Despite the limitations, our study has some strengths. This study is the first of its kind to explore the burden of common mental disorders and examine factors predicting lifetime suicidality and major depressive disorder. Further, this study has attempted to bring the attention of researchers to the need for future in-depth mixed-method studies with representative sample size to explore and better understand the experience of mental disorders and suicidality among OAT service users and necessary interventions resource-limited settings.

## 5. Conclusions

The findings from our study demonstrate high prevalence of common mental disorders and suicidality among OAT service users in Nepal. The most common mental disorders were lifetime major depressive disorder, alcohol use disorder followed by antisocial personality disorder. One in four service users had lifetime suicidality which puts a spotlight in this huge public health problem among OAT service users in low resource setting. While both lifetime major depressive disorder and suicidality were independently associated with a Kessler-6 score  $\geq 13$ , lifetime suicidality were also independently associated with lifetime psychotic disorder and antisocial personality disorder.

While there is investment in harm reduction interventions directed to prevention of new HIV infections and decreasing drug overdose related mortality, not adequately taking suicidality and serious mental disorders into consideration does not help the cause of saving lives; the main agenda of any harm reduction program. To reduce morbidity and mortality in OAT service users, routine regular screening for suicidality and common mental disorders and provision of comprehensive care including accessible, appropriate, culturally appropriate mental health assessment and treatment are essential in Nepal and other resource-limited settings.

## Funding

The research is funded by the “Collaboration in Higher education in Mental health between Nepal and Norway-the COMENTH/NORPART project”. URL: <https://www.med.uio.no/klinmed/english/research/projects/comenth/>. The funding institution was not involved in data collection, analysis and manuscript writing and finalization.

## Ethical approval

The study was approved by Regional Committees for Medical and Health Research Ethics in Norway (Ref. no: 154194) and Nepal Health Research Council (Ref. no: 1698).

## CRediT authorship contribution statement

**Sagun Ballav Pant:** Conceptualization, Methodology, Data curation, Formal analysis, Project administration, Visualization, Writing – original draft. **Suraj Bahadur Thapa:** Resources, Software, Visualization, Formal analysis, Validation, Writing – review & editing, Funding acquisition, Supervision. **John Howard:** Writing – review & editing, Methodology, Software, Project administration, Resources. **Saroj Prasad Ojha:** Supervision, Validation, Writing – review & editing. **Lars Lien:** Resources, Software, Visualization, Formal analysis, Validation, Writing – review & editing, Supervision.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## Acknowledgement

We would like to express our gratitude to all the OAT sites of the Kathmandu valley. We are very grateful to Dr. Dipesh Bhattarai and Dr. Nagendra Luitel for reviewing and proof reading the manuscript.

## References

- Aas, C. F., Vold, J. H., Skurtveit, S., Lim, A. G., Ruths, S., Islam, K., Askildsen, J. E., Løberg, E.-M., Lars Thore, Fadnes, Johansson, K. A., Aas, C. F., Buljovic, V. B., Chalabianloo, F., Daltveit, J. T., Alpers, S. E., Fadnes, Lars T., Eriksen, T. F., Gundersen, P., Hille, V., Håberg, K. H., Johansson, K. A., Leiva, R. A., Carlsen, S.-E. L., Bonnier, M. L., Lorås, L., Løberg, E.-M., Nordbotn, M. H., Nygård, C., Olsvold, M., Ohldieck, C., Sivertsen, L., Torjussen, H., Vold, J. H., Økland, J.-M., Eielens, T. L., Maldonado, N. L. O., Wilk, E. J., Bjørnstad, R., Lygren, O. J., Pierron, M. C., Dalgard, O., Midgard, H., Skurtveit, S., & Vickerman, P., for the INTRO-HCV Study Group. (2020). Health-related quality of life of long-term patients receiving opioid agonist therapy: a nested prospective cohort study in Norway. *Subst. Abuse Treat. Prev. Pol.*, 15, 68. <https://doi.org/10.1186/s13011-020-00309-y>
- Ambekar, A., Rao, R., Pun, A., Kumar, S., & Kishore, K. (2013). The trajectory of methadone maintenance treatment in Nepal. *Int. J. Drug Pol.*, 24, e57–e60. <https://doi.org/10.1016/j.drugpo.2013.06.001>
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders: DSM-5TM, Diagnostic and statistical manual of mental disorders: DSM-5TM*. Arlington, VA, US: 5th ed. American Psychiatric Publishing, Inc. <https://doi.org/10.1176/appi.books.9780890425596>
- Armstrong, G., Jorm, A. F., Samson, L., Joubert, L., Nuken, A., Singh, S., & Kermod, M. (2013). Association of depression, anxiety, and suicidal ideation with high-risk behaviors among men who inject drugs in Delhi, India. *JAIDS J. Acquir. Immune Defic. Syndr.*, 64, 502–510. <https://doi.org/10.1097/QAI.0b013e3182a7ef21>
- Chan, S. M., & Fung, T. C. T. (2014). Reliability and validity of K10 and K6 in screening depressive symptoms in Hong Kong adolescents. *Vulnerable Child. Youth Stud.*, 9, 75–85. <https://doi.org/10.1080/17450128.2013.861620>
- Chen, V. C.-H., Lin, T.-Y., Lee, C. T.-C., Lai, T.-J., Chen, H., Ferri, C. P., & Gossop, M. (2010). Suicide attempts prior to starting methadone maintenance treatment in Taiwan. *Drug Alcohol Depend.*, 109, 139–143. <https://doi.org/10.1016/j.drugalcdep.2009.12.023>
- Comiskey, C. M., & Cox, G. (2010). Analysis of the impact of treatment setting on outcomes from methadone treatment. *J. Subst. Abuse Treat.*, 39, 195–201. <https://doi.org/10.1016/j.jsat.2010.05.007>
- Cottler, L. B., Campbell, W., Krishna, V. A. S., Cunningham-Williams, R. M., & Ben Abdallah, A. (2005). Predictors of high rates of suicidal ideation among drug users.

- J. Nerv. Ment. Dis.*, 193, 431–437. <https://doi.org/10.1097/01.nmd.0000168245.56563.90>
- Dahal, S., Dhimal, M., Pant, S. B., Sharma, P., Marahatta, K., Luitel, N., Shakya, S., Labh, S., Ojha, S. P., Jha, A. K., & Sheehan, D. V. (2020). Pilot mental health survey, Nepal: lessons learned for survey design and instrumentation. *Innov. Clin. Neurosci.*, 17, 17–23.
- Daniel, W. W., & Cross, C. L. (2013). *Biostatistics: A Foundation for Analysis in the Health Sciences*, 10 p. 958). Wiley.
- Dhimal, M., Dahal, S., Adhikari, K., Koirala, P., Bista, B., Luitel, N., Pant, S., Marahatta, K., Shakya, S., Sharma, P., Ghimire, S., Gyanwali, P., Ojha, S. P., & Jha, A. K. (2022). A nationwide prevalence of common mental disorders and suicidality in Nepal: evidence from national mental health survey, 2019–2020. *J. Nepal Health Res. Counc.*, 19, 740–747. <https://doi.org/10.33314/jnhrc.v19i04.4017>
- Ferro, M. A. (2019). The psychometric properties of the kessler psychological distress scale (K6) in an epidemiological sample of Canadian youth. *Can. J. Psychiatr.*, 64, 647–657. <https://doi.org/10.1177/0706743718818414>
- Gyawali, B., Choulagai, B. P., Paneru, D. P., Ahmad, M., Leppin, A., & Kallestrup, P. (2016). Prevalence and correlates of psychological distress symptoms among patients with substance use disorders in drug rehabilitation centers in urban Nepal: a cross-sectional study. *BMC Psychiatr.*, 16, 314. <https://doi.org/10.1186/s12888-016-1003-6>
- Harvard Medical School. (2005), 22 [https://www.hcp.med.harvard.edu/ncs/k6\\_scales.php](https://www.hcp.med.harvard.edu/ncs/k6_scales.php) accessed 7.19.22.
- Iskandar, S., van Crevel, R., Hidayat, T., Siregar, I. M. P., Achmad, T. H., van der Ven, A. J., & De Jong, C. A. (2013). Severity of psychiatric and physical problems is associated with lower quality of life in methadone patients in Indonesia. *Am. J. Addict.*, 22, 425–431. <https://doi.org/10.1111/j.1521-0391.2013.00334.x>
- Jha, A. K., Ojha, S. P., Dahal, S., Sharma, P., Pant, S. B., Labh, S., Marahatta, K., Shakya, S., Adhikari, R. P., Joshi, D., Luitel, N. P., & Dhimal, M. (2019). Prevalence of mental disorders in Nepal: findings from the pilot study. *J. Nepal Health Res. Counc.*, 17, 141–147. <https://doi.org/10.33314/jnhrc.v0i0.1960>
- Joshi, S. K., & Acharya, K. (2019). Modification of Kuppuswamy's socioeconomic status scale in the context of Nepal. *Kathmandu Univ. Med. J. KUMJ*, 17, 1–2, 2019.
- Kermode, M., Choudhurimayum, R. S., Rajkumar, L. S., Haregu, T., & Armstrong, G. (2020). Retention and outcomes for clients attending a methadone clinic in a resource-constrained setting: a mixed methods prospective cohort study in Imphal, Northeast India. *Harm Reduct. J.*, 17, 68. <https://doi.org/10.1186/s12954-020-00413-z>
- Kessler, R. C., Barker, P. R., Colpe, L. J., Epstein, J. F., Gfroerer, J. C., Hiripi, E., Howes, M. J., Normand, S.-L. T., Manderscheid, R. W., Walters, E. E., & Zaslavsky, A. M. (2003). Screening for serious mental illness in the general population. *Arch. Gen. Psychiatr.*, 60, 184–189. <https://doi.org/10.1001/archpsyc.60.2.184>
- Khan, A., Uddin, R., Alam, N., Sultana, S., Alam, M.-U., & Ahmed, R. (2019). Psychometric properties of the Bangla version of the kessler psychological distress scale (K6). *Glob. Psychiatry*, 2, 183–194. <https://doi.org/10.2478/gp-2019-0016>
- Kidd, B., Matthews, K., & Higgins, C. (2018). Co-morbid psychiatric symptoms and clinical outcomes for treatment – seeking opioiddependent patients prescribed methadone opioid substitution therapy (OST): a 7year prospective cohort study. *Ment. Health Addict. Res.*, 3. <https://doi.org/10.15761/MHAR.1000171>
- Ko, J., & Harrington, D. (2016). Factor structure and validity of the K6 scale for adults with suicidal ideation. *J. Soc. Soc. Work. Res.*, 7, 43–63. <https://doi.org/10.1086/685033>
- Lal, R., Deb, K. S., & Kedia, S. (2015). Substance use in women: current status and future directions. *Indian J. Psychiatr.*, 57, S275. <https://doi.org/10.4103/0019-5545.161491>
- Lamont, R., Rosic, T., Sanger, N., & Samaan, Z. (2020). Psychosis and comorbid opioid use disorder: characteristics and outcomes in opioid substitution therapy. *Schizophr. Bull. Open*, 1. <https://doi.org/10.1093/schizbullopen/sgaa007>. sgaa007.
- Le, S. M., Trouiller, P., Duong, T. H., Khuat, T. H. O., Pham, M. K., Vallo, R., Rapoud, D., Quillet, C., Nguyen, T. L., Nguyen, Q. D., Nham, T. T. T., Hoang, T. G., Feelemyer, J., Vu, H. V., Moles, J.-P., Doan, H. Q., Laureillard, D., Des Jarlais, D. C., Nagot, N., & Michel, L., for the D.S.T. (2022). Development and assessment of a community-based screening tool for mental health disorders among people who inject drugs. *Drug Alcohol Rev.*, 41, 697–705. <https://doi.org/10.1111/dar.13402>
- Lien, I. A., Bolstad, I., Lien, L., & Bramness, J. G. (2022). Screening for depression in patients in treatment for alcohol use disorder using the Beck Depression Inventory-II and the Hopkins Symptom Checklist-10. *Psychiatr. Res.*, 308, Article 114363. <https://doi.org/10.1016/j.psychres.2021.114363>
- Michel, L., Lions, C., Maradan, G., Mora, M., Marcellin, F., Morel, A., Spire, B., Roux, P., & Carrieri, P. M. (2015). Suicidal risk among patients enrolled in methadone maintenance treatment: HCV status and implications for suicide prevention (ANRS Methaville). *Compr. Psychiatr.*, 62, 123–131. <https://doi.org/10.1016/j.comppsych.2015.07.004>
- Ministry of Home Affairs. (2022) accessed 7.17.22 <http://www.drugportal.gov.np/assets/uploads/>.
- Moazen-Zadeh, E., Ziafat, K., Yazdani, K., Kamel, M. M., Wong, J. S. H., Modabbernia, A., Blanken, P., Verthein, U., Schütz, C. G., Jang, K., Akhondzadeh, S., & Krausz, R. M. (2021). Impact of opioid agonist treatment on mental health in patients with opioid use disorder: a systematic review and network meta-analysis of randomized clinical trials. *Am. J. Drug Alcohol Abuse*, 47, 280–304. <https://doi.org/10.1080/00952990.2021.1887202>
- Morin, K. A., Eibl, J. K., Gauthier, G., Rush, B., Mushquash, C., Lightfoot, N. E., & Marsh, D. C. (2020). A cohort study evaluating the association between concurrent mental disorders, mortality, morbidity, and continuous treatment retention for patients in opioid agonist treatment (OAT) across Ontario, Canada, using

- administrative health data. *Harm Reduct. J.*, 17, 51. <https://doi.org/10.1186/s12954-020-00396-x>
- Naito, Y., Enomoto, N., Kameno, Y., Yamasue, H., Suda, T., & Hotta, Y. (2021). Kessler psychological distress (K6) questionnaire scores can predict autistic traits and the current and prospective suicidal ideation in medical university students: a prospective study. *Sage Open*, 11, Article 2158244021994590. <https://doi.org/10.1177/2158244021994590>
- Naji, L., Dennis, B. B., Bawor, M., Varenbut, M., Daiter, J., Plater, C., Pare, G., Marsh, D. C., Worster, A., Desai, D., MacKillop, J., Thabane, L., & Samaan, Z. (2017). The association between age of onset of opioid use and comorbidity among opioid dependent patients receiving methadone maintenance therapy. *Addiction Sci. Clin. Pract.*, 12, 9. <https://doi.org/10.1186/s13722-017-0074-0>
- Nepal, R., Priyanka, J., Chhetri, P., Godar, S., Timsina, P., & Doranga, S. (2022). Factors associated with problematic alcohol consumption among adults in putalibazar municipality of Syangja District, Nepal. *Adv. Public Health*, 2022, Article e7588153. <https://doi.org/10.1155/2022/7588153>
- Padmanathan, P., Forbes, H., Redaniel, M. T., Gunnell, D., Lewer, D., Moran, P., Watson, B., Degenhardt, L., & Hickman, M. (2022). Self-harm and suicide during and after opioid agonist treatment among primary care patients in England: a cohort study. *Lancet Psychiatr.*, 9, 151–159. [https://doi.org/10.1016/S2215-0366\(21\)00392-8](https://doi.org/10.1016/S2215-0366(21)00392-8)
- Panthee, B., Shimazu, A., & Kawakami, N. (2014). Validation of Nepalese version of utrecht work engagement scale. *J. Occup. Health*, 56, 421–429. <https://doi.org/10.1539/joh.14-0041-OA>
- Panthee, B., Panthee, S., Shimazu, A., & Kawakami, N. (2020). Validation of the Nepalese version of recovery experience questionnaire. *Heliyon*, 6, Article e03645. <https://doi.org/10.1016/j.heliyon.2020.e03645>
- Pratt, L. A. (2009). Serious psychological distress, as measured by the K6, and mortality. *Ann. Epidemiol.*, 19, 202–209. <https://doi.org/10.1016/j.annepidem.2008.12.005>
- Pyakuryal, A., Tausig, M., Subedi, S., & Subedi, J. (2011). Strangers in a familiar land: the psychological consequences of internal migration in a developing country. *Stress Health*, 27, e199–e208. <https://doi.org/10.1002/smi.1363>
- Rao, R., Agrawal, A., Kishore, K., & Ambekar, A. (2013). Delivery models of opioid agonist maintenance treatment in South Asia: a good beginning. *Bull. World Health Organ.*, 91, 150–153. <https://doi.org/10.2471/BLT.12.111815>
- Reduction International, Harm (2020). *The Global State of Harm Reduction 2020* accessed 7.17.22 <https://www.hri.global/global-state-of-harm-reduction-2020>
- Risal, A., Manandhar, K., Linde, M., Steiner, T. J., & Holen, A. (2016). Anxiety and depression in Nepal: prevalence, comorbidity and associations. *BMC Psychiatr.*, 16, 102. <https://doi.org/10.1186/s12888-016-0810-0>
- Rosic, T., Worster, A., Thabane, L., Marsh, D. C., & Samaan, Z. (2020). Exploring psychological symptoms and associated factors in patients receiving medication-assisted treatment for opioid-use disorder. *BJPsych Open*, 6, e8. <https://doi.org/10.1192/bjo.2019.99>
- Sheehan, D. V. (2016). *The MINI International Neuropsychiatric Interview*. Harm Research Institute, 22 Version 7.0. 2. <https://harmresearch.org/product/mini-international-neuropsychiatric-interview-mini-7-0-2/> accessed 7.21.22.
- Sheehan, D. V., Lecrubier, Y., Sheehan, K. H., Amorim, P., Janavs, J., Weiller, E., Hergueta, T., Baker, R., & Dunbar, G. C. (1998). The Mini-International Neuropsychiatric Interview (M.I.N.I.): the development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. *J. Clin. Psychiatr.*, 59(Suppl. 20), 22–33. quiz 34–57.
- Tanji, F., Tomata, Y., Zhang, S., Otsuka, T., & Tsuji, I. (2018). Psychological distress and completed suicide in Japan: a comparison of the impact of moderate and severe psychological distress. *Prev. Med.*, 116, 99–103. <https://doi.org/10.1016/j.ypmed.2018.09.007>
- World Drug Report 2022 [WWW Document]. U. N. Off. Drugs Crime. URL://www.unodc.org/unodc/en/data-and-analysis/world-drug-report-2022.html (accessed 7.17.22).
- Vold, J. H., Loberg, E.-M., Aas, C. F., Steier, J. A., Johansson, K. A., & Fadnes, L. T. (2022). Prevalence and correlates of suicide attempts in high-risk populations: a cross-sectional study among patients receiving opioid agonist therapy in Norway. *BMC Psychiatr.*, 22, 181. <https://doi.org/10.1186/s12888-022-03829-y>
- Wojciechowski, T. (2021). Antisocial personality disorder as a risk factor for opioid use: the dual mediating roles of antisocial attitudes and self-control. *J. Drug Issues*, 51, 268–283. <https://doi.org/10.1177/0022042620979630>
- World Health Organization. (2009). *Guidelines for the Psychosocially Assisted Pharmacological Treatment of Opioid Dependence, Guidelines for the Psychosocially Assisted Pharmacological Treatment of Opioid Dependence*. World Health Organization.
- Zhang, X., Xu, H., Gu, J., Lau, J. T. F., Hao, C., Zhao, Y., Davis, A., & Hao, Y. (2016). Depression, suicidal ideation, and related factors of methadone maintenance treatment users in Guangzhou, China. *AIDS Care*, 28, 851–856. <https://doi.org/10.1080/09540121.2015.1124981>
- Zhong, B., Xiang, Y., Cao, X., Li, Y., Zhu, J., & Chiu, H. F. K. (2014). Prevalence of antisocial personality disorder among Chinese individuals receiving treatment for heroin dependence: a meta-analysis. *Shanghai Arch. Psychiatr.*, 26, 259–271. <https://doi.org/10.11919/j.issn.1002-0829.214091>
- Zhong, B. L., Xie, W. X., Zhu, J. H., Lu, J., & Chen, H. (2019). Prevalence and correlates of suicide attempt among Chinese individuals receiving methadone maintenance treatment for heroin dependence. *Sci. Rep.*, 9, Article 15859. <https://doi.org/10.1038/s41598-019-52440-x>