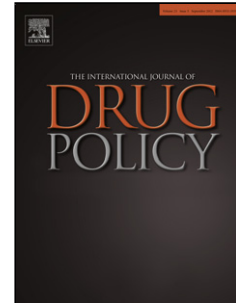


Accepted Manuscript

Title: Prevalence and correlates of psychological distress among drug users in Phnom Penh, Cambodia

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PII: S0955-3959(16)30171-2
DOI: <http://dx.doi.org/doi:10.1016/j.drugpo.2016.06.002>
Reference: DRUPOL 1799

To appear in: *International Journal of Drug Policy*

Received date: 15-12-2015
Revised date: 12-3-2016
Accepted date: 1-6-2016

Please cite this article as: Yi, S., Tuot, S., Chhoun, P., Pal, K., Choub, S. C., and Mburu, G., Prevalence and correlates of psychological distress among drug users in Phnom Penh, Cambodia, *International Journal of Drug Policy* (2016), <http://dx.doi.org/10.1016/j.drugpo.2016.06.002>

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Towards integrating mental health, harm reduction and HIV services for drug users in Cambodia

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1 **Prevalence and correlates of psychological distress among drug users**
2 **in Phnom Penh, Cambodia**

3

4 **ABSTRACT**

5 *Background:* Compared to the general population, drug users are at increased risk of
6 both poor mental health and HIV infection. The aim of this study was to determine
7 the prevalence and correlates of high psychological distress among drug users in
8 Cambodia.

9 *Methods:* In April 2014, a two-stage cluster sampling method was used to randomly
10 select 169 drug users from hotspots in Phnom Penh. Psychological distress was
11 measured using General Health Questionnaire (GHQ-12). Bivariate and multivariable
12 analyses were conducted to identify factors associated with levels of psychological
13 distress among this population.

14 *Results:* Our study found high prevalence of attempted suicide (15.3%), drug related
15 arrests (46.2%), and incarceration (31.4%). Of the 169 participants, 42.0% were found
16 to have high levels of psychological distress, indicating poor mental health. After
17 adjustment, high levels of psychological distress were independently associated with
18 suicidal ideation ($p < 0.001$), higher frequency of drug use ($p = 0.02$), sharing of
19 needles or syringes ($p = 0.005$), and having been sent to a rehabilitation centre ($p =$
20 0.02). In addition, participants who perceived their overall health as being poor or
21 very poor were more likely to have high levels of psychological distress ($p = 0.002$).

22 *Conclusions:* Integration of mental health within HIV and needle and syringe
23 exchange programmes is required to address psychological distress among drug users
24 in Cambodia. Health system interventions, such as screening, referral, and training of
25 health providers, need to be strengthened. In addition, interventions addressing social

26 determinants of mental health and mitigation of frequent arrests and improving
27 conditions in rehabilitation centres are required.

28

29 *Keywords:* Mental health; Drug use; HIV; Harm reduction; Integration; Cambodia

30

31 **Introduction**

32 Poor mental health is a source of significant public health burden globally
33 (Whiteford et al., 2013). In 2010, mental health was the 11th most important cause of
34 morbidity and mortality globally (Murray et al., 2012). Mental health conditions are
35 also among the most difficult to treat (Stein & Seedat, 2007). In many contexts,
36 people with severe mental disorders are also the most vulnerable and socially
37 excluded (Funk, Drew, Freeman, & Edwige, 2010). Although prevalence of poor
38 mental health differs by contexts and sensitivity of screening methods (Charlson,
39 Diminic, Lund, Degenhardt, & Whiteford, 2014), evidence suggests that, compared to
40 the general population, drug users are more likely to have mental disorders
41 (Armstrong, et al., 2013; Brienza et al., 2000; Conner, Piquart, & Duberstein, 2008;
42 Knowlton et al., 2001).

43 Research has shown that the relationship between mental disorders and drug
44 use is complex and either can proceed, reinforce, or be the consequence of the other
45 (Buckingham, Schrage, & Cournos, 2013). Drug use is often a behavioural
46 mechanism for coping with mental health symptoms (Loue, Sajatovic, & Mendez,
47 2011). While understanding the causation sequence remains relevant, evidence
48 suggest that severity of poor mental health is often correlated with the extent of drug
49 dependence, unmet service needs (Li et al., 2015), and in some cases, adverse
50 childhood experiences (Kang, Deren, & Goldstein, 2002) of drug users. In addition,

51 while the direction of the effect may differ, gender is also an important mediator of
52 the way in which poor mental health is experienced or coped with among this
53 population (Loue et al., 2011; Pettes et al., 2015; Shaw et al., 2015; Springer, Chen, &
54 Altice, 2009).

55 HIV is often overlaid within this complex situation: poor mental health,
56 particularly depression, is often linked with an increased uptake of high-risk
57 behaviours and ultimately, HIV infection among drug users. Various studies have
58 shown that drug users with severe depressive symptoms and suicidal thoughts are
59 more likely to share needles and syringes (Armstrong, Jorm, et al., 2013; Mackesy-
60 Amiti, Donenberg, & Ouellet, 2014). Those with severe depression and suicidal
61 thoughts have a greater frequency of unsafe drug injection (Li et al., 2013; Pilowsky,
62 Wu, Burchett, Blazer, & Ling, 2011), more sexual partners, and greater frequency of
63 unprotected sex (Armstrong, Jorm, et al., 2013; Pettes et al., 2015).

64 Once infected with HIV, poor mental health can lead to poor treatment
65 outcomes among drug users, including poor adherence to antiretroviral therapy
66 (Carrieri et al., 2003; Palmer, Salcedo, Miller, Winiarski, & Arno, 2003), faster
67 disease progression (Bouhnik et al., 2005), and increased hospitalisation (Marimoutou
68 et al., 2003). In addition, improvement in mental health has been noted following
69 initiation of antiretroviral therapy among drug users. Standard interventions in HIV
70 treatment, such as motivational counselling, adherence counselling, peer-based
71 support, and case management, often have a positive psychological impact, which in
72 turn reduces substance use (Springer et al., 2009). These observations suggest that
73 better linkages between mental health, HIV prevention and treatment, and needle-
74 exchange programmes could be beneficial.

75 In particular, it is important to identify how the already defined packages of
76 mental health services (Patel & Thornicroft, 2009) can be delivered to drug users in
77 low- and middle-income countries. In countries such as Cambodia, limited progress
78 has been made in the understanding patterns of mental health among this population.
79 In response to this gap, this paper documents the prevalence and correlates of high
80 psychological distress among drug users in Phnom Penh, Cambodia.

81

82 **Methods**

83 *Study sites, sampling and training*

84 In April 2014, data used for this study were collected as part of an impact
85 evaluation of the Sustainable Action against HIV and AIDS in Communities
86 (SAHACOM) project implemented by KHANA, the largest national non-
87 governmental organisation providing integrated HIV prevention, care, and support
88 services at the community level in Cambodia. The details of the SAHACOM project
89 have been published elsewhere (Yi, Chhoun, Brant, Kita, & Tuot, 2014; Yi et al.,
90 2015). The study participants were randomly selected for face-to-face interviews from
91 a list of hotspots obtained from KHANA's partners who implemented the
92 SAHACOM programmes in the capital city of Phnom Penh.

93 A two-stage cluster sampling method was used to select the study sample. At
94 the first stage, the probability proportional-to-size sampling method was used to select
95 hotspots from the list. At the second stage, because of the small number of reachable
96 participants who use drugs in the programmes, all drug using clients in the selected
97 hotspots were invited to participate in the study. A person would be included in the
98 study if they: (1) were at least 18 years of age; (2) had used any form of illicit drugs in

99 the past three months; (3) were able to present themselves on the day of the interview;
100 and (4) were able to provide informed consent to participate in the study.

101 All research team members were trained for three days on the study methods,
102 interview techniques, privacy assurance, and confidentiality. The training also
103 addressed quality control strategies, such as rechecking and reviewing the
104 questionnaires after administration and resolving issues that might arise during the
105 fieldwork. Data collection team leaders were encouraged to perform regular reviews
106 on the progress of the data collection and communicate any issues that may occur
107 during the data collection.

108

109 *Questionnaire development and measurements*

110 A structured questionnaire was first developed in English and then translated
111 into Khmer, the national language of Cambodia. The Khmer questionnaire was back-
112 translated and pretested with a sample of 10 drug users to ensure that wording and
113 contents were culturally suitable and clearly understandable for the respondents. We
114 also received comments from experts working on HIV and mental health in key
115 populations in Cambodia and the questionnaire was finalised based on their feedbacks
116 and findings from the pilot phase.

117 Standardised tools were adapted from previous studies in the same population
118 (Heng & Tuot, 2013), the most recent Cambodia Demographic and Health Survey
119 (National Institute of Public Health National Institute of Statistics and ORC Macro,
120 2010) as well as from other studies in Cambodia (Yi et al., 2010). Socio-demographic
121 characteristics included age, marital status, completed years of formal education,
122 average monthly income, and living situations. In addition, we also collected
123 information on self-perception of level of HIV risk compared to the general

124 population, self-rated overall health and quality of life, suicidal thoughts and suicide
125 attempts in the past three months.

126 Regarding illicit drug use, participants were questioned about types of illicit
127 drugs and frequency of use in the past three months, duration since the first use and
128 age at the first use. For those who reported injecting drugs, they were also asked
129 whether they had used needles or syringes that had been used by someone else in the
130 past three months. In addition, respondents were questioned about whether they had
131 been arrested because of drugs-related acts, sent to a rehabilitation centre, or
132 incarcerated. These rehabilitation centres are community-based treatment centres that
133 are meant to provide care and treatment services (including access to HIV prevention,
134 treatment, and care resources), as well as vocational training for drug users.

135 Adverse childhood experiences were measured using five questions adapted
136 from the brief screening version of the Childhood Trauma Questionnaire (Bernstein et
137 al., 2003). The questions collected information on the experience of physical abuse,
138 emotional abuse, sexual abuse, physical neglect, and emotional neglect with five
139 response options ranging from (1) 'never' to (5) 'very often'. Participants who
140 responded 'never' or 'rarely' were grouped together as those without adverse
141 childhood experiences and those who answered 'sometimes', 'often', or 'very often'
142 as those with adverse childhood experiences.

143 We also adapted five items from the brief screening version of the Childhood
144 Trauma Questionnaire to enquire about family dysfunction (Bernstein, Ahluvalia,
145 Pogge, & Handelsman, 1997; Bernstein et al., 2003). The items collected information
146 on 'witnessing violence against a family member', 'having an alcoholic or drug user
147 family member', 'having a family member who was depressed, mentally ill, or who
148 has attempted suicide', 'having parents who had been separated or divorced', and

149 'having a family member who has been to prison'. The response options for all the
150 items were 'yes' or 'no,' except for 'having parents who had been separated or
151 divorced'. For this item, another response option was added to indicate if one or both
152 parents had died. In the analysis, participants whose parents had divorced or separated
153 were grouped together with participants whose parent(s) had died.

154 Psychological distress was measured using a short version of the General
155 Health Questionnaire (GHQ-12) (Goldberg, 1972), which has been validated in Asian
156 populations (Zulkefly & Baharudin, 2010). Each item was rated on a four-point
157 Likert-like scale ranging from "0= less than usual" to "3= much more than usual".
158 The scoring method '0-0-1-1' was used as it is believed to help eliminate biases
159 resulted from respondents who tend to choose responses 0 and 3 or 1 and 2 (Goldberg
160 & Williams, 1988). The mean score for the whole study population (GHQ-12= 3) was
161 used as a cut-off to define lower and higher levels of psychological distress as it
162 provides the best threshold for discriminating those with psychological distress from
163 those without, especially considering documented variation of GHQ scores from place
164 to place (Goldberg, Oldehinkel, & Ormel, 1998). Using the mean as a threshold is
165 consistent with previous cut offs (Brody et al., 2016). The Cronbach's alpha among
166 participants in this study was 0.78.

167

168 ***Data analyses***

169 Double data entry was performed using EpiData version 3 (Odense,
170 Denmark). In bivariate analyses, we used χ^2 test, or Fisher's exact test when sample
171 sizes were smaller than five in one cell, for categorical variables. Student's *t*-test was
172 used for continuous variables to compare socio-demographic characteristics, self-
173 rated overall health and quality of life, history of illicit drug use, and adverse

174 childhood experiences among participants who had a lower level of psychological
175 distress ($\text{GHQ-12} \leq 3$) to those among participants who had a higher level of
176 psychological distress ($\text{GHQ-12} > 3$).

177 A multivariable logistic regression model was then constructed to control for
178 the effects of potential confounding factors. We included age, gender, and all
179 variables associated with psychological distress in bivariate analyses at a level of $p <$
180 0.05 in the model. Adjusted odds ratio (AOR) were obtained and presented with 95%
181 confidence intervals (CI) and p -values. SPSS version 22 (IBM Corporation, New
182 York, USA) was used for all statistical analyses.

183

184 *Ethical statement*

185 The National Ethics Committee for Health Research of the Ministry of Health,
186 Cambodia approved this study (Reference no. 082NECHR). A written informed
187 consent was obtained from each participant after it was made clear that participation
188 in this study was voluntary and that they could refuse or discontinue their
189 participation at any time. We protected privacy of the respondents by conducting the
190 interviews at a private place and no personal identifiers were collected in the
191 questionnaires or field notes.

192

193 **Results**

194 *Social economic characteristics*

195 A total of 169 drug users participated in the study with a mean age of 31.1
196 (SD= 6.3); of whom 76.9% were male, 42.6% were married or cohabiting, 32.5%
197 were self-employed, and 79.8% had been tested for HIV in the six months preceding
198 the study. The majority (58.9%) of the respondents thought that their HIV risk was

199 either the same or lower than that of the general population. More than two-thirds
200 (69.9%) of the respondents reported that their overall health was either poor, very
201 poor, or neither good nor poor, and 77.6% reported that their overall quality of life
202 was either poor, very poor, or neither good nor poor. Over a quarter (26.6%) reported
203 suicidal ideation, and 15.3% reported having attempted suicide in the past three
204 months (Table 1).

205

206 *Drug use characteristics*

207 Approximately a half (47.6%) of the respondents reported using any illicit
208 drug on a daily basis. In regard to patterns of drug use, 65.1% reported using
209 methamphetamine, 35.5% reported using heroin, and 34.3% reported injecting drugs
210 in the three months preceding the study. Of those who injected drugs, 24.6% reported
211 sharing needles or syringes in the past three months. Of total, 19.5% of the
212 participants reported having been sent to a rehabilitation centre in the past 12 months,
213 46.2% reported having been arrested in relation to drug acts in their life time, and
214 31.4% reported having been incarcerated in their lifetime (Table 2).

215

216 *Characteristics related to adverse childhood experiences*

217 A significant number of respondents reported having been physically hurt that
218 needed medical care (61.7%) or that a family member had said hurtful or insulting
219 things to them (66.5%) when they were growing up. More than half (52.1%) came
220 from families in which parents had been separated or divorced. In addition, 43.7%
221 reported that a parent or guardian had been physically abused, while 38.3% reported
222 having a family member who was a problem drinker or a drug user, and 31.1%

223 reported that a family member had been to prison when they were growing up (Table
224 3).

225

226 ***Bivariate results of factors associated with psychological distress***

227 In total, 42.0% were found to have high levels of psychological distress,
228 indicating poor mental health. As shown Table 1, a high level of psychological
229 distress was significantly associated with self-perception of poor overall health ($p <$
230 0.001), self-perception of poor quality of life ($p = 0.01$), suicidal ideation ($p < 0.001$),
231 and suicide attempts ($p = 0.02$). Table 2 shows that a higher level of psychological
232 distress was significantly associated with frequency of illicit drug use ($p = 0.04$),
233 methamphetamine use ($p < 0.001$), younger age at first use of illicit drugs ($p = 0.005$),
234 sharing of needles or syringes in the past three months ($p = 0.001$), having been sent to
235 a rehabilitation centre in the past 12 months ($p = 0.005$), and having been incarcerated
236 in lifetime ($p = 0.04$). Further analysis of factors associated with higher level of
237 psychological distress was conducted in relation to adverse childhood experiences.
238 Table 3 shows that higher level of psychological distress was significantly associated
239 with having a family member who said hurtful or insulting things to them ($p = 0.03$) or
240 who had been to prison ($p = 0.005$).

241

242 ***Factors independently associated with psychological distress***

243 The results of multivariate analysis are shown in Table 4. After controlling for
244 potential confounders, elevated levels of psychological distress remained significantly
245 associated with perception of poor overall health condition (AOR= 9.60, 95% CI=
246 2.36-8.99), having suicidal ideation (AOR= 6.30, 95% CI= 1.93-10.60), higher
247 frequency of drug use in the past 3 months (AOR= 0.32, 95% CI= 0.13-0.82), having

248 shared needles or syringes in the past three months (AOR= 5.55, 95% CI= 2.34-
249 13.38), and having been sent to a rehabilitation centre in the past 12 months (AOR=
250 2.93, 95% CI= 1.12-8.72).

251

252 **Discussion**

253

254 We set out to describe the prevalence of psychological distress among drug
255 users in Cambodia and factors that are associated with it. Our main results show that
256 42% of participants in this study had a high level of psychological distress, indicating
257 poor mental health, based on pre-specified GHQ-12 based criteria. These findings
258 support observations from other contexts showing high prevalence of various forms of
259 mental health disorders among drug users. In their 2013 study conducted in India,
260 Armstrong et al found very high prevalence of depressive symptoms (84%), anxiety
261 (71%), and suicidal ideation (36%) in their drug using study participants. In the
262 United States, a study of 528 drug users found that 54% of those in needle exchange
263 programmes and 42% of those in methadone maintenance therapy had major
264 depression (Brienza et al., 2000). Overall, evidence from systematic reviews and
265 longitudinal studies suggests that depression, antisocial personality disorders,
266 alcoholism, and suicidal ideation are particularly common among drug users (Conner
267 et al., 2008; Knowlton et al., 2001).

268 In addition, our study demonstrates that high levels of psychological distress
269 are independently linked to perception of poor overall health, drug use frequency,
270 suicidal ideation, sharing of needles or syringes, and having been sent to a
271 rehabilitation centre. These results support findings from other studies suggesting
272 that psychological distress is often associated with suicidal ideation (Armstrong et al.,

273 2014; Bell, Russ, Kivimaki, Stamatakis, & Batty, 2015) and risky behaviours
274 involving injecting drugs (Stein, Solomon, Herman, Anderson, & Miller, 2003).

275 It may seem counterintuitive that having been sent to a drug rehabilitation
276 centre is associated with higher levels of psychological distress. However, across
277 Asia, including Cambodia, these compulsory rehabilitation centers have found to limit
278 access to HIV and wider healthcare (Kamarulzaman & McBrayer, 2015), and violate
279 basic human rights (Amon, Pearshouse, Cohen, & Schleifer, 2013) of drug users. In
280 some instances, patients are forced into labor and physically, and sometimes sexually
281 abused (Amon et al., 2013). Although not directly predictive of high levels of
282 psychological stress, our study also found high prevalence of suicide attempts (15%),
283 drug related arrests (46%), incarceration (31%), and a history of physical (61%) and
284 psychological (67%) abuse during childhood. The high prevalence of psychological
285 distress should be interpreted within a wider context in which psychiatric symptoms
286 among older populations exposed to past traumatic events are also common (Dubois
287 et al., 2004).

288

289 **Improving mental health among drug users**

290 Based on the findings of our and other studies, we suggest that a combination
291 of interventions that strengthen systems to deliver appropriately integrated
292 interventions to improve the social determinants of poor mental health among drug
293 users are needed.

294

295 ***Health systems strengthening model***

296 In particular, these findings have important implications for ensuring that drug
297 users are screened and referred to preventive and therapeutic mental health

298 interventions. In addition, better linkage between harm reduction, especially needle
299 and syringe exchange programmes, with both HIV and mental health services is
300 required. This means that screening of mental health symptoms ought to happen
301 regularly within HIV and harm reduction services. Conversely, regular HIV testing
302 among recipients of mental health and incarcerated drug users is required, given the
303 link between poor mental health and HIV risk (Stockman & Strathdee, 2010).
304 Training of existing health providers on these issues (Charlson et al., 2014;
305 Mendenhall et al., 2014), as well as task shifting of mental health screening to non-
306 clinicians (McInnis & Merajver, 2011) and other innovative models (Eaton et al.,
307 2011) may be required in Cambodia and other resource-poor settings.

308 The limitation of this model is that mental health care is poorly developed in
309 low- and middle-income countries and is currently being confronted by lack of
310 prioritisation, scarcity of human and financial resources, and difficulties in finding
311 innovative public mental health programmes that can be scaled up (Eaton et al.,
312 2011). A recent survey showed that more than 75% of those identified with serious
313 anxiety, mood, or substance use disorders in low- and middle-income countries
314 received no care at all (Demyttenaere et al., 2004). As such, a pragmatic short-term
315 goal could be to train health providers in the relatively developed HIV and harm
316 reduction programmes to screen and prevent poor mental health outcomes, while at
317 the same time increasing investments to strengthen mental health services in the long
318 term. Studies suggest that peer and motivational counseling available in HIV and
319 harm reduction programmes have a positive effect on mental health outcomes
320 (Springer et al., 2009), and therefore adapting these pre-existing services could be a
321 realistic short-term approach. Finally, emphasis on local policies and guidelines is

322 required. Although global recommendations related to mental health exist,
323 implementation is lacking (Stein & Seedat, 2007).

324

325 *Social determinants model*

326 A fundamental argument for a social ecological model is that a significant
327 proportion of psychological distress and other mental health symptoms can be
328 improved by addressing social determinants of poor mental health (Fisher & Baum,
329 2010). In relation to drug users, these interventions include creating awareness
330 (Armstrong & Samson, 2016), mental health promotion, social protection, livelihood,
331 employment, and psychosocial support (Amirkhanian, Kelly, & McAuliffe, 2003) at
332 the community level. In addition, strengthening the collaboration between mental
333 health outreach teams and police departments (Girard et al., 2014) can mitigate some
334 systemic and structural factors that cause or exacerbate mental distress such as
335 frequent arrests and incarceration. The long-term goal should be to move from
336 institutional to family-centered and community-based mental health services (Tomori
337 et al., 2014), and in this context, outside of rehabilitation centers. Our findings
338 demonstrate a clear link between past treatment at rehabilitation centers and higher
339 levels of psychological distress. Previous commentators have called for a shift
340 towards human and evidence-based treatment of drug users (Amon et al., 2013; Csete
341 et al., 2011). As such, these “rehabilitation” centres should be re-evaluated.
342 Interventions should also be gender sensitive, targeting individuals as well as others
343 within their family and social networks (Kermode, Songput, Sono, Jamir, & Devine,
344 2012; Loue et al., 2011). This is particularly relevant in Cambodia given that majority
345 (59%) of participants in our study thought that their HIV risk was either the same or
346 lower than that of the general population, emphasising the need for greater health

347 awareness and empowerment of drug users in the study context. At the same time,
348 creating systems that respond to adverse childhood experiences, such as physical and
349 psychological abuse and neglect, may also reduce incidence of drug use (Macleod et
350 al., 2013) as well as poor mental health in this and other populations (De Venter,
351 Demyttenaere, & Bruffaerts, 2013).

352

353 **Implications for HIV Programmes**

354 These models and interventions have specific relevance to HIV prevention.
355 Our findings indicate that individuals in distress are more than five times more likely
356 to report recently sharing used syringes but less likely to inject drugs daily. Other
357 studies have also shown that drug users have a greater frequency of unsafe drug
358 injection if they are facing mental health difficulties (Li et al., 2013; Pilowsky et al.,
359 2011). Given the link between unsafe drug injecting and HIV transmission, a nuanced
360 approach of integrating mental health screening in HIV prevention and needle syringe
361 exchange programmes could be beneficial. In Cambodia, HIV service providers
362 should be trained to screen for psychological distress and other mental health
363 symptoms among those accessing HIV testing in keeping with the health systems
364 strengthening model. This approach has been successfully implemented in Ethiopia
365 (Wissow et al., 2015). At the community level, peer-based outreach, needle exchange
366 and community-based support groups should be expanded to include screening and
367 psychosocial support for those identified with psychological distress, in keeping with
368 the social determinant model. This approach has also been successfully implemented
369 within Hepatitis C programmes in Australia (Norman et al., 2008). In the Cambodian
370 context, cultural sensitivity of mental health interventions (Armstrong & Samson,

371 2016) is critical, given the history of mass violence, trauma, and genocide (Dubois et
372 al., 2004; Mollica, Brooks, Tor, Lopes-Cardozo, & Silove, 2014).

373

374 **Limitations of the study**

375 Data were collected only from participants in the capital city where the
376 SAHACOM, a comprehensive community-based project aiming to improve health
377 and quality of life of key populations, has been implemented. Because the
378 SAHACOM focuses on these key populations, including drug users, participants had
379 an existing link to prevention and care services. The levels of risks and outcomes
380 reported in this study may therefore represent a more optimistic view than in other
381 areas of Cambodia. Due to the cross-sectional design of the study, causal inferences
382 were not possible. Our study was designed to identify prevalence among drug users
383 without a priori hypothesis. Because we were uncertain of how many participants we
384 would reach, a prior sample size was not determined. In the end, all drug users
385 identified at hot spots were invited to participate. All measures were self-reported,
386 which could have been influenced by social desirability and recall bias. However,
387 efforts were made to reduce these biases, including the study procedures that ensured
388 confidentiality and privacy. Finally, the use of the mean score of the GHQ-12 as the
389 cut-point (GHQ-12 > 3) for higher levels of psychological distress could have
390 underestimated the prevalence of psychological distress. GHQ-12 scores can vary
391 from one place to another (Goldberg et al., 1998). However, in the absence of studies
392 assessing psychological distress among the general populations using the same scale,
393 we used this cut off based on our previous (Brody et al., 2016) and ongoing (Yi et al.,
394 2016) studies.

395

396 **Conclusions**

397 This study shows that suicidal ideation, sharing of needles or syringes, and
398 being sent to a rehabilitation centre are independently predictive of elevated levels of
399 psychological distress. We suggest that a combination of health systems strengthening
400 that involves screening, referral, and training of health providers, as well as
401 addressing social determinants of mental health symptoms that involves mental health
402 promotion, social protection, livelihood support, employment support, and mitigation
403 of frequent arrests and incarceration is needed. In addition, integration of mental
404 health with HIV, as well as needles and syringe exchange programmes, is needed. To
405 this end, developing and implementing policies and guidelines at the national level
406 will be required.

407

408 **Conflict of interest**

409 None declared.

410

411 **Acknowledgements**

412 This analysis was undertaken as part of the SAHACOM Project funded by the
413 United States Agency for International Development (USAID). The authors thank all
414 participants, implementing partners, and KHANA staff who made this study and the
415 SAHACOM project possible. Contents of this paper are the responsibility of the
416 authors and do not reflect the view of USAID or our respective institutions.

417

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Table 1. Comparisons of characteristics of drug users with a lower and higher level of

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psychological distress

Socio-economic characteristics	Total (n= 169)	Total GHQ-12 score		p-value*
		≤ 3 (n= 98)	> 3 (n= 71)	
Mean age (in year)	31.1 ± 6.3	31.7 ± 6.6	30.2 ± 5.6	0.12
Gender				0.38
Male	130 (76.9)	73 (74.5)	57 (80.3)	
Female	39 (23.1)	25 (25.5)	19 (19.7)	
Years of formal education completed	5.2 ± 4.1	5.3 ± 4.2	5.1 ± 3.8	0.67
Marital status				0.57
Never married	65 (38.5)	38 (38.8)	27 (38.0)	
Married and living together	72 (42.6)	44 (44.9)	28 (39.4)	
Divorced/separated/widowed	32 (18.9)	16 (16.3)	16 (22.5)	
Main occupation				0.26
Unemployed	23 (13.6)	10 (10.2)	13 (18.3)	
Self-employed	55 (32.5)	32 (32.7)	23 (32.4)	
Farmer/laborer	38 (22.5)	25 (25.5)	13 (18.3)	
Office worker	10 (5.9)	8 (8.2)	2 (2.8)	
Other	43 (25.4)	23 (23.5)	20 (28.2)	
Average monthly income (in USD)	340 ± 586	340 ± 621	280 ± 540	0.51
Tested for HIV in the past 6 months	130 (79.8)	76 (80.0)	54 (79.4)	0.93
Self-perception of HIV risk compared to the general population				0.99
Higher	61 (37.4)	35 (37.6)	26 (37.1)	
Same	21 (12.9)	12 (12.9)	9 (12.9)	
Lower	75 (46.0)	43 (46.2)	32 (45.7)	
Don't know	6 (3.7)	3 (3.2)	3 (4.3)	
Self-rated overall health				< 0.001

Good/very good	51 (30.2)	39 (39.8)	12 (16.9)	
Neither good nor poor	78 (46.2)	47 (48.0)	31 (43.7)	
Poor/very poor	40 (23.7)	12 (12.2)	28 (39.4)	
Self-rated quality of life				0.01
Good/very good	38 (22.5)	29 (29.6)	9 (12.7)	
Neither good nor poor	101 (59.8)	56 (57.1)	45 (63.4)	
Poor/very poor	30 (17.8)	13 (13.3)	17 (23.9)	
Suicidal ideation (past 3 months)	45 (26.6)	15 (15.3)	30 (42.3)	< 0.001
Suicide attempts (past 3 months)	25 (15.3)	9 (9.7)	16 (22.9)	0.02

627 *Abbreviations: GHQ-12, 12-Item General Health Questionnaire.*

628 *Values are number (%) for categorical variables and mean \pm SD for continuous variables.*

629 **Chi-square test or Fisher's exact test was used for categorical variables and Student's t-test*
 630 *was used for continuous variables.*

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647 **Table 2.** Comparisons of illicit drug use and related history among drug users with a lower
 648 and higher level of psychological distress

<i>Illicit drug use</i>	Total (<i>n</i> = 169)	Total GHQ-12 score		<i>p</i> -value*
		≤3 (<i>n</i> =98)	>3 (<i>n</i> =71)	
Frequency of illicit drugs in the past 3 months				0.04
Not everyday	87 (52.4)	48 (49.5)	39 (56.5)	
Everyday	79 (47.6)	49 (50.5)	30 (43.5)	
Methamphetamine use in the past 3 months	110 (65.1)	53 (54.1)	57 (80.3)	<0.001
Heroin use in the past 3 months	60 (35.5)	36 (36.7)	24 (33.8)	0.69
Duration since first use of drugs (in months)	100.7±68.8	92.8±63.1	111.4±75.5	0.08
Age at the first use of illicit drugs	21.3±6.4	22.5±7.0	19.7±5.0	0.005
Injected drugs in the past 3 months	58 (34.3)	31 (31.6)	27 (38.0)	0.39
Used needles/syringes that had been used by someone else in the past 3 months	14 (24.6)	2 (6.7)	12 (44.4)	0.001
Had been arrested because of drugs-related acts in lifetime	78 (46.2)	40 (40.8)	38 (53.5)	0.10
Had been sent to a rehabilitation center in past 12 months	33 (19.5)	12 (12.2)	21 (29.6)	0.005
Duration of last time in rehabilitation center (in months)	3.4 ± 3.6	2.2 ± 1.2	4.1 ± 4.3	0.15
Had been incarcerated in lifetime	53 (31.4)	25 (25.4)	28 (39.4)	0.04
Times being incarcerated	1.5 ± 0.7	1.6 ± 0.8	1.4 ± 0.6	0.29
Duration of last incarceration (in months)	14.8 ± 16.9	16.8±20.9	13.0±12.4	0.42

649 *Abbreviations: GHQ-12, 12-Item General Health Questionnaire.*

650 *Values are number (%) for categorical variables and mean ± SD for continuous variables.*

651 **Chi-square test was used for categorical variables and Student's t-test was used for*
 652 *continuous variables.*

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656 **Table 3.** Comparisons of adverse childhood experiences and family dysfunction among drug
 657 users with lower and higher levels of psychological distress

<i>Adverse childhood experiences and family dysfunction</i>	Total (n= 169)	Total GHQ-12 score		<i>p-value*</i>
		≤3 (n= 98)	>3 (n=71)	
<i>Adverse childhood experiences</i>				
Physically hurt that needed medical care	103 (61.7)	56 (57.7)	47 (67.1)	0.22
Family member said hurtful or insulting things to	111 (66.5)	58 (59.8)	53 (75.7)	0.03
Someone touched in a sexual way	51 (30.5)	29 (29.9)	22 (31.4)	0.83
Had someone to take care of or protect	164 (98.2)	95 (97.9)	69 (98.6)	0.76
Someone in family made me feel that I was loved	160 (95.8)	94 (96.9)	66 (94.3)	0.40
<i>Family dysfunction</i>				
Parent or guardian had been physically abused	73 (43.7)	40 (41.2)	33 (47.1)	0.45
Family member was a problem drinker/drug user	64 (38.3)	33 (34.0)	31 (44.3)	0.18
Family member had been depressed/mentally ill	43 (25.7)	21 (21.6)	22 (31.4)	0.15
Parents ever been separated or divorced	87 (52.1)	48 (49.5)	39 (55.7)	0.43
Family member had been to prison	52 (31.1)	22 (22.7)	30 (42.9)	0.005

658 *Abbreviations: GHQ-12, 12-Item General Health Questionnaire.*

659 *Values are number (%).*

660 **Chi-square test was used.*

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671 **Table 4.** Factors associated with high levels of psychological distress among drug users in
 672 multiple logistic regression model

<i>Variable</i>	Total score of GHQ-12 > 3	
	AOR (95% CI)	<i>p</i> -value*
Age	0.99 (0.91-1.08)	0.85
Gender		
Male	Reference	
Female	0.35 (0.11-1.07)	0.07
Self-rated overall health		
Good/very good	Reference	
Neither good nor poor	3.65 (1.07-12.42)	0.04
Poor/very poor	9.60 (2.36-8.99)	0.002
Self-rated quality of life		
Good/very good	Reference	
Neither good nor poor	1.38 (0.41-4.65)	0.65
Poor/very poor	2.27 (0.53-9.76)	0.27
Having suicidal ideation in the past 3 months		
No	Reference	
Yes	6.30 (1.93-10.60)	0.002
Having attempted suicide in the past 3 months		
No	Reference	
Yes	0.39 (0.16-2.03)	0.36
Drug use frequency in the past 3 months		
Not everyday	Reference	
Everyday	0.32 (0.13-0.82)	0.02
Used needles/syringes that had been used by someone else in the past 3 months		
No	Reference	

Yes	5.55 (2.34-13.38)	0.005
Had been arrested because of drugs-related acts in lifetime		
No	Reference	
Yes	0.64 (0.25-1.64)	0.35
Had been sent to a rehabilitation center in the past 12 months		
No	Reference	
Yes	2.93 (1.12-8.72)	0.02
Had been incarcerated in lifetime		
No	Reference	
Yes	1.54 (0.58-4.10)	0.39
Family member said hurtful or insulting things to when growing up		
No	Reference	
Yes	0.32 (0.58-4.10)	0.82
Family member had been to prison		
No	Reference	
Yes	1.55 (0.60-3.99)	0.37

673 *Abbreviations: GHQ-12, 12-Item General Health Questionnaire.*

674 *AOR, adjusted odds ratio; CI, confidence interval.*

675 **All variables in the table were included simultaneously in the multivariate logistic regression*

676 *model.*

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679 **Conflict of Interest Statement**

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681 The authors declare that they have no conflict of interest.

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