The prevalence and service utilisation associated with mental and substance use disorders in Lao People's Democratic Republic: findings from a cross-sectional survey

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Aims. An epidemiological survey was conducted to determine the prevalence of the mental and substance use disorders and ascertain patterns of mental health services utilisation in Lao People's Democratic Republic (Lao PDR) with the aim of evaluating existing gaps and opportunities in the provision of mental health services.

Methods. This study was a cross-sectional, household survey of adults living within Vientiane Capital province, Lao PDR. We collected data on participant demographics, mental and physical health status, family history of mental illness and exposure to potential risk factors. It also collected data on mental health service utilisation patterns, types of health professionals and treatment being accessed, barriers to treatment and perceived need for care. The MINI International Neuropsychiatric Interview (MINI v.6.0) was also administered to assess mental disorder prevalence.

Results. Age- and sex-standardised current prevalence of any disorder was estimated at 15.2% (95% CI 11.0–20.7). Alcohol dependence (5.5% (95% CI 3.2–9.6)), was the most prevalent followed by anxiety disorders (5.2% (95% CI 3.2–8.3)) and mood disorders (2.5% (95% CI 1.5–4.4)). 11.0% (95% CI 5.8–20.1) of participants with a mental and/or substance use disorder suffered from other comorbid disorders. A number of variables demonstrated significant effects in final logistic regression models, including family history, education and employment for mental disorders; and gender, numbers of hours worked per week and number of dependants for substance use disorders. Having a mental or substance use disorder was associated with an OR of 11.6 of suicidality over participants without a mental or substance use disorder (95% CI 2.8–58.5). Of the 101 participants who met criteria for a current mental or substance use disorder, only two (2.1% (95% CI 0.5–8.0)) had accessed services for their mental health in the past 12 months. No participants who had seen a health professional in the past 12 months reported getting as much help as they needed. The vast majority (89.2% (95% CI 76.5–95.4)) of participants meeting criteria for a current mental or substance use disorder reported that they had not experienced mental health problems in the past 12 months.

Conclusions. This study presents the first epidemiological estimates for a range of mental and substance use disorders in the general population of the most populous province in Lao PDR. A large treatment gap exists for mental and substance use disorders in Lao PDR. This research adds value for health care and has been an important precursor to developing informed and targeted mental health policy, services and health system reform in Lao PDR.

Introduction

Mental and substance use disorders are the leading cause of disability-associated burden of disease worldwide (Murray *et al.* 2013). Yet, unmet needs for mental

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health treatment are high globally, particularly in less-developed countries (Wang *et al.* 2007). Lao People's Democratic Republic is a lower middle-income country in South East Asia. The Lao Ministry of Health currently has in place a mental health strategy that aims to reform the delivery of mental health services – the National Mental Health Strategy and Strategic Plan (Lao PDR Ministry of Health, 2012). A pivotal element of this strategy is ascertaining epidemiological data and a national mental health survey is part of the Lao People's Democratic Republic (Lao PDR) Mental

Health Strategy and a target for 2020. To-date no population based survey of these disorders has been conducted in Lao PDR. Reliable epidemiological data to understand the extent and distribution of mental and substance use disorders will have important implications for resource planning and service delivery in Lao PDR.

Mental health services within Lao PDR are very limited. There are only two psychiatrists serving the entire country. There are also only two psychiatric inpatient units in the country with 35 beds available in total; both are located in the main city of Vientiane Capital. The only two outpatient clinics are also located in Vientiane Capital to service the entire population of approximately 6.1 million people. BasicNeeds, an international non-government organisation (INGO) specialising in mental health and operating in Lao PDR, has been implementing community mental health services in the Vientiane Capital, Borikhamxay Province and Vientiane Province (BasicNeeds, 2016). However, the development of mental health services has been on an *ad hoc* basis, hampered by a lack of data on population mental health needs, treatment gaps, patterns of service utilisation and barriers to service access. This information is needed to more comprehensively plan mental health service expansion and reform and best utilise the limited available resources. In other countries, such as China, national mental health surveys have identified previously unrecognised unmet needs (particularly for common mental disorders) and overall treatment gaps, and have been important drivers of mental health system improvement.

The objectives of the epidemiological survey were to:

- Determine the prevalence of the major mental and substance use disorders among the general adult population of Lao PDR;
- Determine factors associated with mental and substance use disorder prevalence in Lao PDR;
- Ascertain patterns of mental health services utilisation, types of treatment being accessed, and perceived need for and barriers to treatment.

Methods

Study design and sampling strategy

This study was a cross-sectional, household survey within Vientiane Capital, a province in the central region of Lao PDR, which encompasses the capital and surrounding rural areas. It is the most populous province with approximately 2.1 million people and is made up of nine districts comprised of 264 urban villages and 227 rural villages. The survey was administered face-to-face by trained lay-interviewers. Each

participant was required to reside permanently at the dwelling selected by the interviewer and needed to be an adult household member over 18 years of age.

The sampling frame was the population of Vientiane Capital province over 18 years of age. Probabilistic sampling was used to ensure that data were representative of the general population. The survey utilised a randomised multistage, cluster sampling method. A desire to stratify by urbanicity during the analysis led to deliberate selection of equal numbers of urban and rural villages. The target sample size was distributed proportionally across clusters according to the population size of each cluster. A target sample size of 760 was calculated to detect disorders with a prevalence of 1% with a sampling error of 0.01.

Selection of households and participants within a village were done randomly using one of two methods. Where maps were available for a village, segments were first randomly selected (if necessary for larger villages). Households were then selected systematically (every fifth household) by moving in a clockwise direction around the selected segment. If a map was not available for the village, households were selected within each village cluster using the random walk method (EPI-method) (United Nations Children's Fund, 2005). For both methods, one participant was selected from each randomly selected household using a random number generator application on their data collection tablet (for example, number 3 would represent the third oldest household member).

Survey instruments

Individual survey components were administered to respondents, each designed to elucidate different data. The first was a questionnaire designed by the investigators to collect data on participant demographics (including age, sex, education and employment), mental and physical health status, family history of mental illness and exposure to potential risk factors. It also collected data on mental health service utilisation patterns, types of health professionals and treatment being accessed, barriers to treatment and perceived need for care. This was developed drawing upon questionnaires used in similar surveys, such as the Australian Survey of Mental Health and Wellbeing (Burgess *et al.* 2009), but was adapted to the Lao PDR context.

A separate survey instrument, the MINI International Neuropsychiatric Interview (MINI v.6.0) (Lecrubier *et al.* 1997) was also administered to assess mental and substance use disorder prevalence. The MINI is a widely used, relatively short instrument that enables information to be collected by trained lay-interviewers. It is designed to provide a brief

diagnostic evaluation of a range of common mental disorders and provides diagnosis according to DSM-IV and ICD-10 criteria. Reliability and validity tests, using the Composite International Diagnostic Interview (CIDI) as the 'gold standard', have demonstrated good Kappa coefficients, sensitivity and specificity for most diagnoses (Lecrubier *et al.* 1997).

The choice of modules was based on the disorders considered likely to be of most significance to health services in Lao PDR. These include: Module A: Major depressive episode, Module C: Suicidality, Module D: Manic and hypomanic episodes, Module E: Panic disorder, Module I: Post-traumatic stress disorder, Module J: Alcohol abuse and dependence, Module K: Substance abuse and dependence, Module L: Psychotic disorders and Module O: Generalised anxiety disorder (GAD). The MINI was translated into Lao language by an independent, local clinician and the validity was independently verified by means of clinical re-appraisal on 25 subjects by the team psychiatrist (CC) in February 2015.

Data collection

All data were collected by trained-interviewers. Data were collected in the field using an application for hand-held Android devices developed specifically for this survey. The application was supported by a web and mobile platform. The MINI was conducted using the paper version to conform to copyright and individual diagnoses for each MINI module were entered into the Android application post-interview. Data were received in real-time by research teams in Lao PDR and the Queensland Centre for Mental Health Research in Australia, which facilitated instantaneous monitoring and evaluation of data quality and trouble-shooting.

Interviewer training

Experienced interviewers were recruited and underwent an intensive 2-day training workshop run by several of the authors (FC, SD, CC). A review of the survey process, including feedback from the interviewers, was undertaken after completing the first two villages (Dorndaeng in the Chanthabouly district and Dankham in the Sikhottabong district). Additional training was then provided to interviewers and minor modifications made to data collection following this review. Data from surveys in this phase ($N = 105$) were not included in the final analysis.

Statistical analyses

Data analyses were conducted within R-studio version 0.99.902 (R Core Team, 2015; RStudio Team, 2015) using the *survey* package (Lumley, 2010, 2014). The *survey* package allows statistical inferences adjusting for complex survey design. Weights were calculated to standardise by age, sex and district. Standardisation by district was chosen over village due to the lack of population data available for each village.

Two multivariate logistic regression models were built to test what factors are associated with: (1) participants with a diagnosis of a substance use disorder according to the MINI, and (2) participants with a diagnosis of a mental disorder according to the MINI (Lecrubier *et al.* 1997).

Given the large number of demographic variables collected, each logistic regression model was built in a stepwise manner. A series of exploratory univariate logistic regressions were first conducted to help determine which variables to include in each risk factors model. Marital status, urbanicity, birth location, urbanicity of upbringing, number of people living in the dwelling, and years lived in the village were individually tested and found to be very poor predictors of either having a mental disorder or a substance use disorder ($p > 0.20$, see Table S1). This left age, sex, education, employment status, work type, working hours per week, income, number of dependents living with the participant, and family mental health issues to be used in building the multivariate logistic regression models.

Demographic variables were added first in a stepwise manner with the most significant variable added in the first step (i.e., age for mental disorders, sex for substance use disorders), the second most significant variable added in the second step, and so on. Variables entered at each step were tested for significance using a Rao–Scott test within the *survey* package. Variables not significant (or not trending towards significance, $p < 0.06$) when entered were dropped prior to the next step. Coefficients for the final models are shown in Table 4.

Results

Participants

Of the 669 participants selected during the sampling process only two, who were from Ban Fai (Saysetha District), refused to participate for undeclared reasons resulting in a response rate of 99.7%. The list of districts and villages represented by the sample for analysis are available in Fig. 1.

There were no statistically significant difference between the age, sex or education of the included sample and those of the villages of Dorndaeng and Dankham used in the preliminary surveying.

Table 1. *Sample characteristics* (N = 667)

Characteristic	n = 667	Sample proportion (%)
Gender		
Males	292	43.8
Females	375	56.2
Age		
18–29	186	27.9
30–39	167	25.0
40–49	147	22.0
50–64	119	17.8
65+	48	7.2
Marital status		
Married	505	75.7
Single/never married	129	19.3
Widowed	20	3.0
Divorced/separated	13	1.9
Urbanicity		
Urban	347	52.0
Rural	320	48.0
Education		
No formal education	31	4.6
Some/completed primary school	229	34.3
Completed secondary school	272	40.8
College/university	135	20.2
Employment		
Ever worked	426	63.9
Unemployed	379	56.8
Currently working	288	43.2
Work type (currently working)		
Salaried	90	13.5
Business (non-farming)	82	12.3
Farmer	49	7.3
Casual labour	45	6.7
Selling items (e.g., Food, Lao Skirts)	20	3.0
Other	2	0.3
Weekly hours worked		
10–20	13	1.9
21–40	123	18.4
40+	152	22.8
Monthly income		
Paid 'In Kind' (e.g., Food)	1	0.1
1 LAK–200 000 LAK	6	0.9
200 000 LAK–1 000 000 LAK	81	12.1
1 000 000 LAK–2 000 000 LAK	111	16.6
2 000 000+ LAK	89	13.3
Number of people living in dwelling		
1	7	1.0
2–5	464	69.6
5+	196	29.4
Dependents living with participants		
0	131	19.6
1	118	17.7
2	172	25.8
3+	246	36.9
Family mental health issues		
Alcohol or drug	13	1.9

Continued

Table 1. *Continued*

Characteristic	n = 667	Sample proportion (%)
Depression	7	1.0
Anxiety	7	1.0
Psychosis	5	0.7
Other mental health issues	5	0.7
Any mental health issues	28	4.2
No mental health issues	639	95.8

LAK, Lao Kip. At the time of writing 1USD = 8000LAK.

Participants from those two villages were more likely to be currently working.

Sample characteristics are shown in Table 1. The overwhelming majority of participants were of traditional ethnicity (Lao Loum, 96.5%), were Buddhist (95.7%), and almost all were Lao citizens (99.6%). There was evidence of urban migration with 52% of participants currently residing in urban households, but only 40% of participants reporting being raised in urban areas.

Prevalence

Age- and sex-standardised current prevalence of any disorder was estimated at 15.2% (95% CI 11.0–20.7). Alcohol use disorders were the most prevalent followed by anxiety disorders and mood disorders (Table 2).

Current and lifetime prevalence of major depressive disorder (MDD) was found to be 2.1% (95% CI 1.2–3.7) and 3.3% (95% CI 2.2–4.9), respectively. Current

Table 2. *Age, sex and district standardised prevalence estimates, Lao PDR epidemiological survey 2015*

Disorder	Current prevalence % (95% CI)				Lifetime prevalence % (95% CI)			
	n	Total	Male	Female	n	Total	Male	Female
Mood disorders	17	2.5 (1.5–4.4)	2.2 (0.8–5.4)	2.9 (1.5–5.7)	29	4.0 (2.5–6.2)	3.6 (1.8–7.1)	4.3 (2.5–7.2)
Major depressive disorder*	13	2.1 (1.2–3.7)	1.6 (0.5–5.5)	2.5 (1.2–5.1)	23	3.3 (2.2–4.9)	3.3 (1.6–6.8)	3.3 (1.8–6.0)
Mood disorder with psychotic features	2	0.2 (0.1–0.9)	0.3 (0–2.0)	0.2 (0–1.0)	5	0.8 (0.3–1.8)	1.2 (0.4–3.6)	0.3 (0.1–1.2)
Bipolar I	1	0.1 (0–0.7)	0.2 (0–1.4)	–	6	0.7 (0.4–1.4)	0.5 (0.1–2.0)	0.8 (0.3–2.0)
Bipolar II	3	0.3 (0.1–1.3)	0.2 (0–1.4)	0.4 (0.1–1.5)	3	0.3 (0.1–1.3)	0.2 (0–1.4)	0.4 (0.1–1.5)
Anxiety disorders	37	5.2 (3.2–8.3)	3.5 (1.7–7.0)	6.8 (4.1–11.1)	40	5.4 (3.4–8.7)	3.5 (1.7–7.0)	7.3 (4.5–11.7)
Panic disorder†	7	1.2 (0.4–3.2)	0.2 (0–1.4)	2.0 (0.7–6.2)	14	1.9 (0.8–4.3)	0.6 (0.2–1.9)	3.1 (1.4–6.7)
PTSD†	9	1.0 (0.6–1.8)	1.3 (0.6–2.8)	0.7 (0.3–1.6)	9	1.0 (0.6–1.8)	1.3 (0.6–2.8)	0.7 (0.3–1.6)
Generalised anxiety disorder‡	28	3.8 (2.3–6.2)	2.7 (1.1–6.8)	4.8 (3.2–7.2)	28	3.8 (2.3–6.2)	2.7 (1.1–6.8)	4.8 (3.2–7.2)
Psychotic disorders	3	0.5 (0.2–1.4)	0.3 (0–2.0)	0.6 (0.2–2.5)	5	0.8 (0.4–1.6)	0.7 (0.2–2.5)	0.9 (0.4–2.1)
Any mental disorder	50	7.2 (5.2–10.0)	5.1 (2.7–9.2)	9.2 (6.2–13.6)	59	8.2 (6.1–10.9)	5.4 (3.0–9.4)	10.8 (7.9–14.6)
Alcohol use§								
Abuse	13	2.0 (1.1–3.8)	3.4 (1.8–6.6)	0.7 (0.2–2.6)	–	–	–	–
Dependence	36	5.5 (3.2–9.6)	8.9 (5.2–14.9)	2.3 (1.0–5.1)	–	–	–	–
Substance use§								
Abuse	1	0.2 (0–1.4)	0.4 (0.1–2.9)	–	–	–	–	–
Dependence	6	1.1 (0.5–2.5)	2.2 (0.9–4.8)	0.2 (0–1.0)	–	–	–	–
Any substance use disorder	56	8.9 (5.5–14.1)	15.0 (9.3–23.3)	3.1 (1.7–5.8)	–	–	–	–

Note: Estimates are weighted by age, sex and district.
*Current prevalence is in the prior 2 weeks.
†Current prevalence is in the past month.
‡Current prevalence is in the past 6 months.
§Current prevalence is in the past 12 months. Abuse and dependence are mutually exclusive.

Table 3. *Comorbidity among those with mental disorders*

No. of current disorders	Proportion % (95% CI)	S.E. %
1	89.0 (79.8–94.2)	3.8
2	10.1 (4.7–20.3)	4.0
3 or more	1.0 (0.2–5.4)	0.9

Note: Estimates are weighted by age, sex and district. Number of current disorders based on aggregated groups of mood disorders, anxiety disorders, psychosis, alcohol use and substance use.

prevalence of any anxiety disorder was 5.2% (95% CI 3.2–8.3) with GAD being the most prevalent at 3.8% (95% CI 2.3–6.2). Differences between current and lifetime prevalence were not apparent for any anxiety

Table 4. *Odds ratios for mental and substance use disorders*

Variable	Odds ratio	95% CI	*p*
Mental disorders			
Age (continuous)	1.01	0.99–1.03	0.474
Female (*v.* male)	1.91	0.89–4.31	0.135
Family mental health history (*v.* none)	7.21	2.32–20.51	0.009*
Education (*v.* no formal education)			0.036*
Primary school	0.25	0.10–0.65	
High school	0.12	0.06–0.25	
College or university	0.17	0.06–0.45	
Employed (*v.* unemployed)	2.06	1.17–3.65	0.033*
Substance use disorders			
Age (continuous)	0.99	0.96–1.00	0.172
Female (*v.* male)	0.20	0.09–0.41	<0.001*
Work hours per week (*v.* unemployed)			0.027*
10–40 h	1.08	0.33–3.10	
40+ h	3.21	1.97–5.27	
Dependents living with participant (*v.* 0)			0.041*
1	0.22	0.05–0.69	
2	0.27	0.15–0.48	
3+	0.70	0.30–1.64	

**p<0.05.*
Note: Employment, work type and income were not significant predictors of having a substance use disorder after controlling for age and sex (*p* = 0.16, 0.17, and 0.23, respectively). Work type was not a significant predictor of having a mental health disorder after controlling for age, sex and education (*p* = 0.20). Work hours was a significant predictor (*p* = 0.04) of mental disorders however was collinear with employment, which was a stronger predictor and was therefore dropped from the model for mental disorders.

disorder. Trends of higher prevalence of mood and anxiety disorders in females were observed; however, differences were not statistically significant.

Both current and lifetime prevalence of post-traumatic stress disorder (PTSD) was estimated at 1.0% (95% CI 0.6–1.8) with the disorder twice as common in males compared with females (1.3% (95% CI 0.6–2.8) and 0.7% (95% CI 0.3–1.6), respectively). Panic disorder current prevalence was estimated at 1.2% (95% CI 0.4–3.2) and lifetime prevalence at 1.9% (95% CI 0.8–4.3).

Although numbers are low in population surveys, our prevalence of psychotic disorders was estimated at 0.5% (95% CI 0.2–1.4) with little difference found in lifetime prevalence (0.8% (95% CI 0.4–1.6)) and no sex difference.

Twelve-month age-standardised prevalence of substance abuse excluding alcohol was 0.4% (95% CI 0.1–2.9) in males equating to only one case, which was ya baa abuse. No cases of substance abuse were found in females. Age- and sex-standardised prevalence of substance dependence was found to be 1.1% (95% CI 0.5–2.5), equating to five cases in males (four ya baa and one cannabis) and one case in females (benzodiazepines).

Twelve-month age- and sex-standardised prevalence of alcohol abuse and dependence was 2.0% (95% CI 1.1–3.8) and 5.5% (95% CI 3.2–9.6), respectively (abuse and dependence were mutually exclusive). Both alcohol abuse and dependence were around four times higher in males than females.

Comorbidity

Most participants identified with a mental and/or substance use disorder reported no comorbidity; however, 11.0% (95% CI: 5.8–20.1) of participants with a mental and/or substance use disorder suffered from other comorbid disorders (Table 3). The most common comorbidity was between substance use disorders and mood disorders, with 33.7% (95% CI 10.4–69.1) of participants presenting with a substance use disorder also presenting with a mood disorder. Comorbidity between psychotic disorders and mood disorders closely followed, with 31.5% (95% CI 8.0–71.0) of participants presenting with psychotic disorder also presenting with a mood disorder. The comorbidity between anxiety and mood disorders was also high, with 31.4% (95% CI 13.9–56.5) of participants presenting with a mood disorder also presenting with an anxiety disorder. Meanwhile 18.0% of participants presenting with mood disorders also presented with substance use disorders (95% CI 4.7–49.4), and 5.8% presented with psychotic disorder (95% CI 1.1–24.9). Additionally, 15.5% of participants presented with anxiety disorders also presented with mood disorders (95% CI 6.8–31.6).
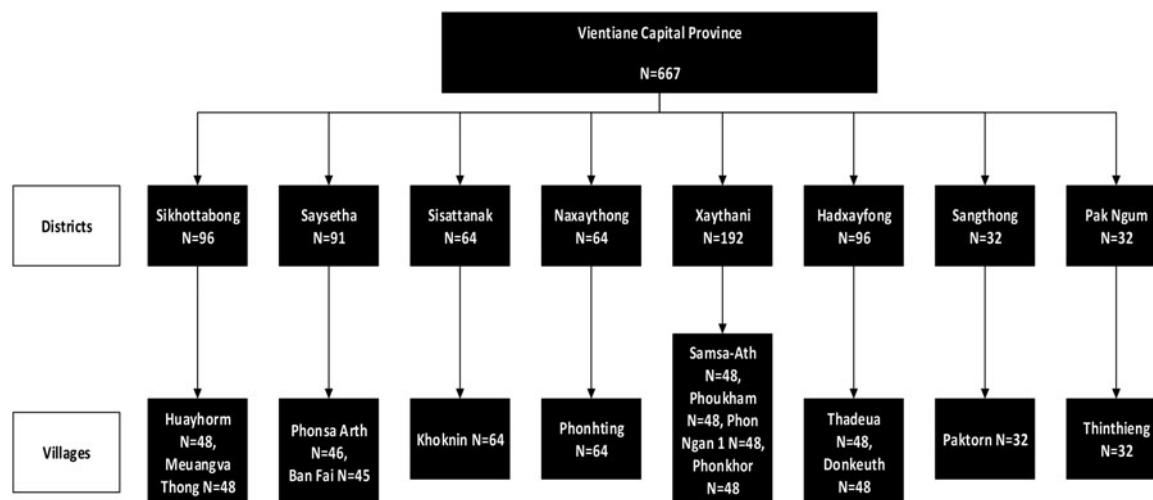
Fig. 1. Sampling flowchart.

Suicidality

Twenty-three participants reported suicidality (3.2% (95% CI 1.8–5.7)); in the majority the level of suicidality was classified as low (2.2% (1.2–3.9); $n = 17$). Fourteen of these 23 participants reported a concomitant mental and/or substance use disorder. Having a mental or substance use disorder was associated with an OR of 11.6 of suicidality over participants without a mental or substance use disorder (95% CI 2.8–58.5). Females were more likely to express low (2.6% (95% CI 1.2–5.7) or moderate (0.6% (95% CI 0.1–3.9) suicidality than males (1.8% (95% CI 0.8–3.8) & 0.3% (95% CI 0.03–2.7) respectively), whereas high suicidality was expressed more in males (0.2% (95% CI 0.02–1.8) *v.* 0.9% (95% CI 0.2–4.1)). There was no significant relationship between suicidality and urbanicity ($p = 0.722$).

While the presence of a mental or substance use disorder was significantly related to suicidality, having more than one disorder increased the risk further, with 55.6% (95% CI 11.0–92.7) of those with co-morbidity reporting suicidality. Of the six participants reporting moderate to high levels of suicidality in the past 12 months, five had a comorbid mental and/or substance use disorder (major depression, substance dependence and/or GAD). All three cases of high-risk suicidality suffered from more than one mental and/or substance use disorder.

Factors associated with mental and substance use disorders

Significant univariate associations were found between a number of variables and the diagnosis of any mental disorder (Table S1). These include a decreased odds with higher levels of education (0.11 (95% CI 0.04–0.31) for completing some or all of high school); and increased odds for participants with family history of mental health issues (6.26 (95% CI 2.21–16.04)).

For substance use disorders, females demonstrated decreased odds of having a disorder compared with males (0.18 (95% CI 0.09–0.34)). Being employed and working more than 40 hours per week were also significantly associated with substance use disorders (1.96 (95% CI 1.08–3.58) and 2.80 (95% CI 1.65–4.76), respectively). Casual employment also presented a higher odds of substance use disorder (5.21 (95% CI 1.56–16.0)) as did a high income (more than 2 million LAK per month; 2.19 (95% CI 1.19–3.90). Having one or two dependents living with participants reduced the odds of a substance use disorder compared with no dependents.

A number of variables demonstrated significant effects in final logistic regression models. These included family history of mental illness, education and employment for mental disorders; and gender, numbers of hours worked per week and number of dependants for substance use disorders (Table 4).

Sensitivity analyses

To test the robustness of the models against influential data-points, a series of sensitivity analyses were conducted excluding participants with the top 1% highest sampling weights (Lumley, 2010). The sensitivity analyses indicated no change in the final logistic regressions after excluding these influential participants. Removal of these participants did not have a meaningful impact on prevalence estimates, with only one influential participant meeting criteria for a disorder according to the MINI (Alcohol Abuse).

Service utilisation

Of the 101 participants who met criteria for a current mental or substance use disorder, only two (2.1% (95% CI 0.5–8.0)) had accessed services for their mental health in the past 12 months (one participant with a current psychotic disorder and a second with current PTSD, 12 month substance use disorder, and past MDD). These individuals had both seen a medical doctor for their mental health at either a hospital or private clinic and were still receiving treatment. For both participants, the duration of contact with the medical doctor was reported as being less than 15 min per visit. One of the participants reported being offered medication at these consultations and the other information about mental illness and talking therapies. Both participants were currently taking psychiatric medications (amitriptyline), with one also taking an anticonvulsant.

One of these two participants plus a third individual reported being admitted to a hospital for their mental health but not in the last 12 months. These two individuals both met criteria for a current psychotic disorder. One of the two had been admitted to a hospital in Thailand and the other in Lao PDR.

A small number of survey participants met criteria for a lifetime, but not current, mental disorder. Of this group, one further person had been in contact with services. This individual met criteria for lifetime bipolar disorder. They had been admitted to a Lao hospital mental health unit in the past 12 months, reportedly for depression, and were still receiving outpatient treatment from a psychiatrist. This person had been offered medication, information about mental illness and talking therapies, and they were currently taking several psychiatric medications (haloperidol, olanzapine, chlorpromazine and diazepam).

All three participants who had seen a health professional in the past 12 months reported not getting as much help as they needed. Each listed a different reason for this: that they would be treated differently if people thought they had a mental illness, they could not afford services, or they could not access help where they lived. A further three participants with a current or lifetime disorder reported that they had experienced mental health problems in the past 12 months but had not sought treatment. Again, each listed a different reason, including: that they would be treated differently if people thought they had a mental illness, they could not afford services, or they relied on faith and spirituality. Six participants also reported to have stopped work in the past due to mental illness.

Spirituality and religion were identified as important self-management strategies for mental illness. In total, 10.8% of participants with a current mental or substance use disorder reported using any self-management strategy in the past 12 months to help with mental health problems (Table 5). This was either in addition to accessing the services reported above, or instead of formal service use. The most commonly endorsed strategy was seeking support from family or friends (4.8%), followed by seeking comfort through religious or spiritual means, such as praying, meditating, attending a religious or spiritual service (3.8%), and doing more of the things they enjoy (3.6%).

The vast majority (89.2% (95% CI 76.5–95.4)) of participants meeting criteria for a current mental or substance use disorder reported that they had not experienced mental health problems in the past 12 months indicating the symptoms they reported to the interviewer that led to the diagnosis were not recognised as being due to a mental health problem.

Discussion

This study presents the first epidemiological estimates for a range of mental and substance use disorders in the general population of the most populous province in Lao PDR, Vientiane Capital. It also examines factors associated with the prevalence of mental and substance use disorders in this population. Additionally, this study describes patterns of health service utilisation of those living with mental and substance use disorders.

Many of the specific disorders included in this study were found to have point prevalence estimates comparable to what has been reported in other countries, particularly China (Phillips *et al.* 2009). It has been noted elsewhere that reported prevalence rates of MDD in Asian countries are typically lower than many other regions of the world (Bromet *et al.* 2011; Ferrari *et al.* 2013). A hypothesis has been put forward that for reasons such as culture and language, many

Table 5. *Strategies used by participants in past 12 months to help with mental health problems*

Strategy	Any current disorder	
	n	% (CI)
Any strategy	12	10.8 (4.6–23.5)
Social support	5	4.8 (2.0–11.0)
Spiritual or religious	6	3.8 (0.9–14.1)
Enjoyable activities	2	3.6 (1.0–11.9)
Alcohol or drugs	1	1.2 (1.9–7.3)
Physical activities	1	0.5 (0.1–3.3)

Note: Estimates are weighted by age, sex and district.

probable cases of MDD are captured as NOS subsyndromal depression when using DSM or ICD criteria (Phillips *et al.* 2009).

We found a prevalence of suicidal ideation of 3.2% (95% CI 1.8–5.7). Consistent with other countries' findings we found a higher prevalence in females and significantly elevated risk with comorbid mental and/or substance use disorders (Nock *et al.* 2008). Our findings show trends of higher prevalence of mental disorders in females, whilst males demonstrated a statistically significant higher prevalence for alcohol and substance use disorders. This is also consistent with the findings of previous studies (Boyd *et al.* 2015).

We found the 12-month prevalence of alcohol abuse and dependence in Lao PDR to be 2.0% (95% CI 1.1–3.8) and 5.5% (95% CI 3.2–9.6), respectively. Cross-national 12-month prevalence estimates of DSM-IV alcohol abuse were found by the World Mental Health Survey initiative to be 1.1% (S.E. 0.1) for developed countries and 1.5% (S.E. 0.1) for developing countries (Glantz *et al.* 2014). When considering that alcohol abuse is typically more prevalent than alcohol dependence, our estimate of alcohol dependence appears high; observations can be made in relation to this finding. The first is that data from other countries in the region is limited; however, robust research from China reports similarly high rates of alcohol abuse and dependence (3.5% (95% CI 3.0–4.0) and 2.3% (95% CI 2.0–2.7), respectively) (Phillips *et al.* 2009). Cultural factors may influence these estimates. Lao PDR has numerous ethnic groups and each one has its own tradition and culture where alcohol plays an important role. There are several festivals providing opportunities to drink alcohol. Furthermore, parties are held to celebrate a promotion, a welcome ceremony for the newborn, a wedding, or a housewarming, as well as to welcome home a person after a trip overseas. It is also plausible that the MINI overestimates alcohol abuse and dependence compared to other diagnostic measures.

A positive association was found between employment, income and substance use disorders. This may suggest that having the financial means to purchase alcohol and illicit drugs may contribute to having a substance use disorder in Lao PDR. Genetic effects on several mental disorders are now well-validated (Cross-Disorder Group of the Psychiatric Genomics, 2013) and a family history of mental illness was found to be a significant predictor of mental illness in our sample.

Age patterns were not apparent from our findings; however, this is likely due to the dataset being underpowered to detect such differences. It is known from other literature that mental and substance use disorders are most prevalent in adolescence and young adulthood (Whiteford *et al.* 2013).

Service utilisation

Very few survey respondents had accessed any health services for their mental illness, with a treatment gap estimated at 97.9%. This rate is concerning and unfortunately comparable with treatment gaps found previously through World Mental Health Surveys in other low-resource settings, including Nigeria (98.4%) and China (96.6%) (Wang *et al.* 2007). The limited mental health services currently available in Lao PDR are concentrated in the site of this survey (Vientiane Capital) and it is anticipated that treatment rates would be even lower in other provinces of Lao PDR. BasicNeeds, in collaboration with the Ministry of Health and provincial health authorities of Vientiane Capital, Borikhamxay and Vientiane Province, has recently decentralised mental health care service delivery at the community level with affordable costs in these three provinces. A number of the 12 district hospitals throughout Lao PDR now have established mental health teams to be responsible for taking care of people with mental health problems in their respective district hospitals. Conducting similar surveys in the surrounding areas of these hospitals would confirm whether these new services have led to improved treatment rates in these provinces.

All individuals who identified as having received mental health treatment reported seeing a medical doctor or psychiatrist at the exclusion of other types of health professionals. There are no allied health professionals working in mental health nationally (World Health Organization, 2014). Psychiatric services in Lao PDR have been centralised in the Mahosot hospital mental health unit in Vientiane, staffed by doctors and nurses, and one psychiatrist. People with mental illness are also known to access treatment by doctors or psychiatrists at hospitals in neighbouring Thailand or through military hospitals and private clinics. This is a finding which reflects a currently missed opportunity to utilise non-specialist mental health workers, such as general nurses working in primary healthcare, who represent a valuable opportunity to integrate and scale-up mental health services. Effective and appropriate training of non-specialist mental health workers throughout Lao PDR could lead to vastly improved treatment rates. Specific strategies which could be considered include: training of trainers to deliver mental health interventions using tools such as the mhGAP-IG (World Health Organization, 2008); training of Buddhist monks in the basic recognition of mental illness and counselling; and establishing the availability of postgraduate training in psychiatry to increase the availability of specialists, either by establishing a program in Lao PDR or through sending doctors abroad.

Service users reported being offered a range of treatments, including medication, information and talking therapies. Services initiated by BasicNeeds comprise medication, talk therapy and social treatment to enable the long-term recovery of people suffering from mental disorders and to reduce the stigma surrounding mental illness. The continued development of this program should improve mental health service access into the future.

Those participants using services for their mental illness also reported that their needs from mental health services were not met. Those who had recognised a need for, but not sought, treatment cited reasons focused around financial and distance barriers to service access and the stigma of mental illness. The survey also indicated a preference for people to self-manage their mental health, particularly through spirituality and social support. However, by far the most prominent barrier to service utilisation for people with mental illness was a lack of recognition that there was a problem. Nearly 90% of participants with a current disorder reported not experiencing any mental health problems in the past year. To close the treatment gap in Lao PDR, a first and important step will be to educate the general population to better recognise symptoms of mental illness and improve awareness about available services.

Limitations

Limitations exist within our study. With respect to sampling, rural villages with no road access were excluded; however, there only three such villages in Vientiane Capital and the impact on results is expected to be minimal and non-significant. The exclusion of the two villages in the preliminary survey resulted in the exclusion of the Chanthabouly district. This also means that our findings may not be generalisable to that district; however, no statistical differences were found between the age, sex and education level of our sample and the two villages. Higher levels of employment in the excluded villages may be because both excluded villages were urban. The exclusion of these two villages and reduced resources also meant that the final sample size fell slightly under the target sample size of $n = 760$ resulting in larger uncertainty around our estimates.

In relation to the findings, no survey participants reported seeing a traditional healer or taking traditional medicines for their mental health. This is unexpected given that past studies have found an equal emphasis on traditional and modern medicine for mental health in Lao culture (Bertrand & Choulamany, 2002). It is possible that use of traditional medicine was underreported due to question phrasing, as the term 'health professional' may not have been interpreted by participants to include traditional healers. However, the question about medication specifically prompted for taking of traditional medicines. Another possibility is that these treatments are viewed more holistically and not attributed to mental health; this seems particularly likely given the poor recognition by participants of mental illness. Spiritual and religious interpretations and treatments for mental illness have been previously identified as important in Lao PDR (Bertrand & Choulamany, 2002), but may have fallen outside the scope of the survey questions about health service use, and may have contributed to the poor self-identification of mental illness amongst survey participants. Spiritual conceptualisations of mental illness are more likely to attribute symptoms to bad spirits, magic or breaking of taboos than a medical problem (Bertrand & Choulamany, 2002). Buddhist monks play an important role in the life of Lao people. The majority of Lao people facing minor or even major problems prefer to consult monks rather than professionals; these consultations are unlikely to have been identified in this survey.

Gold-standard methods for translating materials such as research instruments involve back-translation. Unfortunately, due to resource constraints, this was not undertaken in our survey. The survey instruments were translated by a local psychiatrist and the translated MINI was also compared against the Thai translation of the MINI, which was considered to be highly culturally similar; however, this limitation may have led to some misinterpretations during the interviewing process and may have impacted the validity of the findings.

Implications for Lao PDR

This research provides crucial information for each of the Lao PDR 'National Mental Health Strategy by 2020' 5 pillars – (1) developing human resources, (2) encouraging the development of research culture and capacity, (3) service provision: enhance service delivery at national to local level, (4) mental health promotion and advocacy and (5) policy and legislation (Lao PDR Ministry of Health, 2012).

A large treatment gap exists for mental and substance use disorders in Lao PDR; however, our research and that of others identify many opportunities to improve this. The poor recognition of mental disorders and experiences of stigma identified in this survey highlight the need for a coordinated approach to improving recognition and awareness of mental illness symptoms and reducing stigma at a population level, both of which act as significant barriers to help-

seeking (Clement *et al.* 2015). There is an evidence-base emerging for anti-stigma interventions available for implementation in low- and middle-income countries (Thornicroft *et al.* 2016). However, any strategies designed to increase the demand for mental health treatment needs to be supported by a corresponding improvement in the availability and accessibility of mental health services, which are integrated into primary and other priority healthcare platforms. Successful examples of how this can be done now exist in other LMICs with tools for implementation publically available for use (Lund *et al.* 2015).

Lao PDR has initiated a community-focused, low-cost model for delivering mental health services in Lao PDR and continued expansion of such services should be a priority. However, this will only be possible with a commitment to mental health nationally and by funders.

This research has been an important precursor to developing informed and targeted mental health policy, services and health system reform in Lao PDR. It is hoped that this study will facilitate a future replication study in other Lao PDR provinces to provide a nationally representative sample.

Supplementary material

The supplementary material for this article can be found at https://doi.org/10.1017/S204579601700035X.

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Conflict of Interest

The investigators and authors of this study declare no conflict of interests. The relationship between BasicNeeds and the Lao PDR Ministry of Health is strong. The government provides its full support in working hand-in-hand with BasicNeeds to implement the mental health programme in the country. Moreover, results of this study will be useful for the ministry to establish effective implementation of policy and service reform in the future.

Ethical Standards

Ethics approval was granted by both the National Ethics Committee for Health Research, Lao PDR and the Human Ethics Review Committee at the University of Queensland, Australia.

Availability of Data and Materials

Data from this study is available from the authors upon request.

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