

THE LANCET

Global Health

Supplementary appendix

This appendix formed part of the original submission and has been peer reviewed. We post it as supplied by the authors.

Supplement to: Baranyi G, Scholl C, Fazel S, Patel V, Priebe S, Mundt AP. Severe mental illness and substance use disorders in prisoners in low-income and middle-income countries: a systematic review and meta-analysis of prevalence studies. *Lancet Glob Health* 2019; **7**: e461–71.

SUPPLEMENTARY MATERIALS

Supplementary Material 1: General search terms

Supplementary Table 1: Database searches

Supplementary Material 2: Critical Appraisal Tool

Supplementary Table 2: Quality appraisal of studies reporting severe mental disorders or substance use disorders in prison populations of low- and middle-income countries

Supplementary Table 3: Meta-regression analysis of study characteristics relating to severe mental illnesses

Supplementary Table 4: Sensitivity analysis for severe mental illnesses

Supplementary Table 5: Meta-regression analysis of study characteristics relating to substance use disorders

Supplementary Figure 1: Funnel Plots estimating small sample bias in studies reporting severe mental illnesses and substance use disorders in prison samples in low- and middle-income countries

Supplementary Material 1: General search terms

1. Prison condition:

prison* OR imprison* OR sentence* OR remand* OR jail* OR correctional OR “criminal justice”

2. Epidemiological studies:

Epidemiology (Subject Heading) OR prevalence OR incidence

3. Mental health outcome:

Mental Disorders (Subject Heading) OR Substance-Related Disorders (Subject Heading) OR psychiatr* OR psycho* OR depress* OR bipolar OR schizophren* OR alcohol* OR substance OR addict*

Limit:

1987 to Present

Supplementary Table 1: Database searches

Prison	Epidemiology	Mental health
Applied Social Sciences Index and Abstracts (ASSIA) (1/5/2018) (373)*		
ab(Prison* or imprison* or sentence* or remand* or jail* or correctional or criminal justice) (21,955)	ab(prevalence OR incidence) OR su.Exact("epidemiology") (44,092)	Exact("drug abuse" OR "alcohol related disorders" OR "substance abuse" OR "mental disorders") OR ab(psychiatr* or psycho* or depress* or bipolar or schizophren* or alcohol* or substance or addict*) (176,787)
CAB Abstracts 1973 to 2018 Week 16 (1/5/2018) (112)*		
(Prison* or imprison* or sentence* or remand* or jail* or correctional or criminal justice).mp (2,164)	epidemiology/ or (prevalence or incidence).mp. (447,300)	mental disorders/ or substance abuse/ or (psychiatr* or psycho* or depress* or bipolar or schizophren* or alcohol* or substance or addict*).mp. (285,944)
China Academic Journals Full-text Database in China National Knowledge Infrastructure (CNKI) (24/7/2018) [†]		
prison AND mental; prison AND psychiatric; prison AND depression; prison AND psychosis; prison AND substance; prison AND abuse; prison AND dependence; prison AND addiction jail AND mental; jail AND psychiatric; jail AND depression; jail AND psychosis; jail AND substance; jail AND abuse; jail AND dependence; jail AND addiction		
Criminal Justice Database (1/5/2018) (342)*		
all(Prison* OR imprison* OR sentence* OR remand* OR jail* OR correctional OR “criminal justice”) (51,735)	Exact("epidemiology") OR ab(prevalence or incidence) (10,989)	Exact("substance-related disorders" OR "mental disorders") OR ab(psychiatr* or psycho* or depress* or bipolar or schizophren* or alcohol* or substance or addict*) (63,735)
Embase 1980 to 2018 Week 18 (1/5/2018) (2,718)*		
(Prison* or imprison* or sentence* or remand* or jail* or correctional or criminal justice).mp. (58,898)	epidemiology/ or (prevalence or incidence).mp. (1,909,979)	mental disease/ or drug dependence/ or alcoholism/ or (psychiatr* or psycho* or depress* or bipolar or schizophren* or alcohol* or substance or addict*).mp. (2,863,150)
Global Health 1973 to 2018 Week 16 (1/5/2018) (516)*		
(Prison* or imprison* or sentence* or remand* or jail* or correctional or criminal justice).mp (5,029)	epidemiology/ or (prevalence or incidence).mp. (474,935)	mental disorders/ or substance abuse/ or (psychiatr* or psycho* or depress* or bipolar or schizophren* or alcohol* or substance or addict*).mp. (222,205)
International Bibliography of the Social Sciences (IBSS) (1/5/2018) (116)*		
ab(Prison* OR imprison* OR sentence* OR remand* OR jail* OR correctional OR “criminal justice”) (21,927)	Exact("epidemiology") OR ab(prevalence OR incidence) (30,465)	Exact("substance-related disorders" OR "mental disorders") OR ab(psychiatr* or psycho* or depress* or bipolar or schizophren* or alcohol* or substance or addict*) (66,384)
Latin American and Caribbean Health Sciences Literature (LILACS) (1/5/2018) (120)*		

(tw:(prison\$ OR imprison\$ OR sentence\$ OR remand\$ OR jail\$ OR correctional OR criminal justice) (1,484)	(tw:(epidemiolog\$ OR prevalence OR incidence) (111,772)	(tw:(mental or psychiatr\$ or psycho\$ or depress\$ or bipolar or schizophren\$ or alcohol\$ or substance or addict\$) (108,175)
MEDLINE(R) Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE(R) Daily and Ovid MEDLINE(R) 1946 to Present (1/5/2018) (2,150)*		
(Prison* or imprison* or sentence* or remand* or jail* or correctional or criminal justice).mp. (46,923)	EPIDEMIOLOGY/ or (prevalence or incidence).mp. (1,272,070)	Mental Disorders/ or Substance-Related Disorders/ or (psychiatr* or psycho* or depress* or bipolar or schizophren* or alcohol* or substance or addict*).mp. (1,272,070)
National Criminal Justice Reference Service (NCJRS) (1/5/2018) (40)*		
ab(Prison* or imprison* or sentence* or remand* or jail* or correctional or "criminal justice") (63,463)	ab(epidemiolog* OR prevalence OR incidence) (9,603)	Exact("substance abuse (60399)" OR "mental disorders (04529)") AND ab(psychiatr* or psycho* or depress* or bipolar or schizophren* or alcohol* or substance or addict*) (1,183)
PAIS Index (1/5/2018) (27)*		
ab(Prison* or imprison* or sentence* or remand* or jail* or correctional or "criminal justice") (8,867)	Exact("epidemiology") OR ab(prevalence OR incidence) (11,016)	Exact("substance-related disorders" OR "mental disorders") OR ab(psychiatr* or psycho* or depress* or bipolar or schizophren* or alcohol* or substance or addict*) (13,484)
PsycINFO 1806 to April Week 4 2018 (1/5/2018) (1,811)*		
(Prison* or imprison* or sentence* or remand* or jail* or correctional or criminal justice).mp. (77,669)	exp EPIDEMIOLOGY/ or (prevalence or incidence).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures] (149,748)	exp Mental Disorders/ exp Addiction/ or exp Alcohol Abuse/ or exp Drug Abuse/ or exp Drug Addiction/ or exp Alcoholism/ or exp Drug Dependency/ or (psychiatr* or psycho* or depress* or bipolar or schizophren* or alcohol* or substance or addict*).mp. (1,807,188)
Scopus (1/5/2018) (4,125)*		
TITLE-ABS-KEY (prison* OR imprison* OR sentence* OR remand* OR jail* OR correctional OR "criminal justice") (157,693)	TITLE-ABS-KEY (epidemiolog* OR prevalence OR incidence) (2,313,318)	TITLE-ABS-KEY (mental OR psychiatr* OR psycho* OR depress* OR bipolar OR schizophren* OR alcohol* OR substance OR addict*) (4,607,258)
Social Services Abstracts (1/5/2018) (33)*		
ab(Prison* OR imprison* OR sentence* OR remand* OR jail* OR correctional OR "criminal justice") (7,132)	Exact("epidemiology") OR ab(prevalence OR incidence) (15,613)	Exact("substance-related disorders" OR "mental disorders") AND ab(psychiatr* or psycho* or depress* or bipolar or schizophren* or alcohol* or substance or addict*) (4,275)
Grey literature		
Open Grey (1/5/2018) (27)†		
prison* OR imprison* OR sentence* OR remand* OR jail* OR correctional OR "criminal justice" (3,587)	epidemiolog* OR prevalence OR incidence (14,287)	mental OR substance OR psychiatr* OR psycholog* OR smok* OR alcohol* OR substance OR drug OR addict* OR inject* (74,044)
ProQuest Dissertations & Theses Global (1/5/2018) (210)*		
ab(Prison* OR imprison* OR sentence* OR remand* OR jail* OR correctional OR "criminal justice") (31,175)	Exact("epidemiology") OR ab(prevalence OR incidence) (70,689)	Exact("drug abuse" OR "alcohol use" OR "alcoholism" OR "drug addiction" OR "mental disorders") OR ab(psychiatr* or psycho* or depress* or bipolar or schizophren* or alcohol* or substance or addict*) (174,767)
Google Scholar (2/5/2018)†‡		
prison* OR imprison* OR sentence* OR remand* OR jail* OR correctional OR "criminal justice"	prevalence OR incidence	psychiatr* OR psycho* OR substance OR depressi* OR bipolar

* Number after discarding duplicates.

† Hits were not exported in reference manager.

‡ Searches were separately run for each LMIC and about the first 20% of hits were screened.

Supplementary Material 1: Critical Appraisal Tool*

Reviewer: _____ Date: _____

Author: _____ Year: _____ Record No. _____

No.	Item	Rating
External Validity		
1.	Was the study's target population a close representation of the national population in relation to relevant variables? † <u>1 point:</u> Samples from more than one institution, representative for a province or the whole country. <u>0 point:</u> Otherwise.	
2.	Was the sample representative of the target population? * <u>1 point:</u> Stratified random, random, population or systematic sampling. <u>0 point:</u> Convenience sampling.	
3.	Was the sample size adequate? * <u>1 point:</u> Sample size equal to or greater than 200 participants or a pre-calculated sample size reached. <u>0 point:</u> Otherwise.	
4.	Was the data analysis conducted with sufficient coverage of the identified sample? * <u>1 point:</u> Participation rate was equal or higher than 75% or a non-response analysis yielded non-significant results. <u>0 point:</u> Otherwise.	
Internal Validity		
5.	Were the study subjects and the setting described in detail? * <u>1 point:</u> Reporting of the descriptive statistics to describe the sample included gender AND at least three other socio-demographic or criminal characteristic. <u>0 point:</u> Otherwise.	
6.	Was the same standardized interview used for data collection by all subjects? † <u>1 point:</u> Yes. <u>0 point:</u> Other mode of data collection were applied.	
7.	Were objective, standard criteria used for the measurement of the condition? * <u>1 point:</u> Disorders were assessed according to the criteria of DSM or ICD <u>0 point:</u> Conditions were measured with standardized screening scale, which did not fulfil disorder criteria.	
8.	Was the condition measured reliably? * <u>1 point:</u> Psychiatrist(s)/psychologist(s) made the diagnoses. <u>0 point:</u> Trained interviewer(s) made the diagnoses.	
9.	Was there appropriate statistical reporting? * <u>1 point:</u> Confidence intervals/standard deviations were calculated for prevalence rates. <u>0 point:</u> Only prevalence estimates were reported.	
10.	Were subpopulations identified using objective criteria? * <u>1 point:</u> The study explored only female/only male prisoners OR the results were reported separately for male/female prisoners. <u>0 point:</u> The study explored both male and female prisoners, but results were not reported separately.	
Score:		

* taken or adapted from JBI Critical Appraisal Checklist for Studies Reporting Prevalence ¹

† taken or adapted from the Risk of Bias Tool ²

Supplementary Table 2: Quality appraisal of studies reporting severe mental disorders or substance use disorders in prison populations of low- and middle-income countries

Study	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	Score
Adesanya et al. ³	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	6
Andreoli et al. ⁴ M	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	Yes	8
Andreoli et al. ⁴ F	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	9
Assadi et al. ⁵	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	9
Ayrolimeethal et al. ⁶ M	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	8
Ayrolimeethal et al. ⁶ F	No	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	7
Boşgelmez et al. ⁷ M	No	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	7
Boşgelmez et al. ⁷ F	No	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	7
Canazaro & Argimon ⁸	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	8
El-Gilany et al. ⁹	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	8
Goyal et al. ¹⁰	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	7
Joshi et al. ¹¹	No	Yes	No	No	Yes	Yes	Yes	Yes	No	Yes	6
Kaya et al. ¹²	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	6
Kumar & Daria ¹³	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	7
Majekodunmi et al. ¹⁴	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	8
Math et al. ¹⁵	No	Yes	Yes	No	Yes	No	Yes	No	No	No	4
Mundt et al. ¹⁶ M	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	9
Mundt et al. ¹⁶ F	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Yes	Yes	8
Mundt et al. ¹⁷ M	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	10
Mundt et al. ¹⁷ F	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	9
Naidoo & Mkize ¹⁸	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	7
Nanéma et al. ¹⁹	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	6
Ndetei et al. ²⁰	No	Yes	No	No	Yes	Yes	Yes	Yes	No	No	5
Niriella et al. ²¹ M	Yes	Yes	Yes	Yes	No	Yes	Yes	No	No	Yes	7
Niriella et al. ²¹ F	Yes	Yes	No	Yes	No	Yes	Yes	No	No	Yes	6
Pondé et al. ²²	Yes	Yes	Yes	Yes	No	Yes	Yes	No	No	Yes	7
Salifou et al. ²³	No	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	7
Silva et al. ²⁴ M	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	7
Silva et al. ²⁴ F	No	Yes	No	Yes	Yes	Yes	Yes	No	No	Yes	6
Zamzam & Hatta ²⁵	No	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	7

F=Female, M=Male

Supplementary Table 3: Meta-regression analysis of study characteristics relating to severe mental illnesses

	One-year prevalence of psychotic disorders				One-year prevalence of major depressive disorders			
	β	95% CI		p	β	95% CI		p
		lower	upper			lower	upper	
UNIVARIATE ANALYSIS								
Sampled from all prisoners vs at intake	0.186	0.117	0.255	<0.001	0.199	0.066	0.333	0.005
Sex (male vs female)	-0.007	-0.100	0.084	0.862	0.047	-0.081	0.175	0.459
Age (cont.)	-0.014	-0.035	0.007	0.179	-0.001	-0.031	0.032	0.962
Sample size (n<500 vs n≥500)	-0.076	-0.125	-0.027	0.004	-0.116	-0.227	-0.006	0.039
Time spent in prison (<1 y vs ≥1 y)	-0.146	-0.205	-0.087	<0.001	-0.091	-0.226	0.044	0.172
Year of data collection (cont.)	0.002	-0.008	0.011	0.716	0.008	-0.007	0.022	0.305
Interviewer (mental health professional vs other)	0.043	-0.006	0.093	0.083	0.107	-0.005	0.219	0.061
Diagnostic criteria (DSM vs ICD)	-0.052	-0.129	0.024	0.165	-0.054	-0.189	0.081	0.413
Non-response rate (cont.)	-0.0001	-0.003	0.003	0.967	-0.0005	-0.006	0.005	0.835
Quality of the sample (cont.)	0.002	-0.020	0.025	0.831	0.026	-0.013	0.065	0.189
WHO-regions	F _(5,16) = 0.55			0.733	F _(5,20) = 0.40			0.840
MULTIVARATE ANALYSIS								
Sampled from all prisoners vs at intake	0.138	0.019	0.257	0.026	0.168	0.033	0.303	0.017
Sample size (n<500 vs n≥500)	-0.015	-0.104	0.074	0.720	-0.078	-0.182	0.026	0.134
Time spent in prison (<1 y vs ≥1 y)	-0.040	-0.170	0.090	0.515				

Bold values are significant (p<0.05).

Supplementary Table 4: Sensitivity analysis of severe mental illnesses among prisoner populations in low- and middle-income countries (without studies conducted at intake to prison)

	Prevalence Rate		Prevalence Ratio	
	12-month	6-month	12-month	6-month
Psychotic illnesses	6.2 (4.0-8.6)	4.5 (3.1-6.2)	10.7 (6.7-17.1)	13.4 (7.4-24.3)
male	6.6 (3.7-10.2)	4.9 (3.1-7.1)	11.1 (6.0-20.4)	14.4 (6.7-30.7)
female	5.7 (1.9-11.0)	2.7 (0.4-6.3)	8.3 (5.0-13.6)	11.8 (4.5-30.9)
Major Depression	16.0 (11.7-20.8)	12.6 (7.9-18.0)	5.3 (3.9-7.2)	5.2 (3.6-7.6)
male	15.9 (11.1-21.4)	13.3 (8.2-19.4)	6.3 (4.4-9.1)	6.1 (4.0-9.5)
female	19.4 (11.7-28.5)	15.2 (5.1-29.0)	5.3 (3.1-8.9)	6.7 (3.6-12.3)
Schizophrenia			7.9 (4.9-12.7)	
male			7.0 (4.1-11.9)	
female			7.2 (3.9-13.2)	

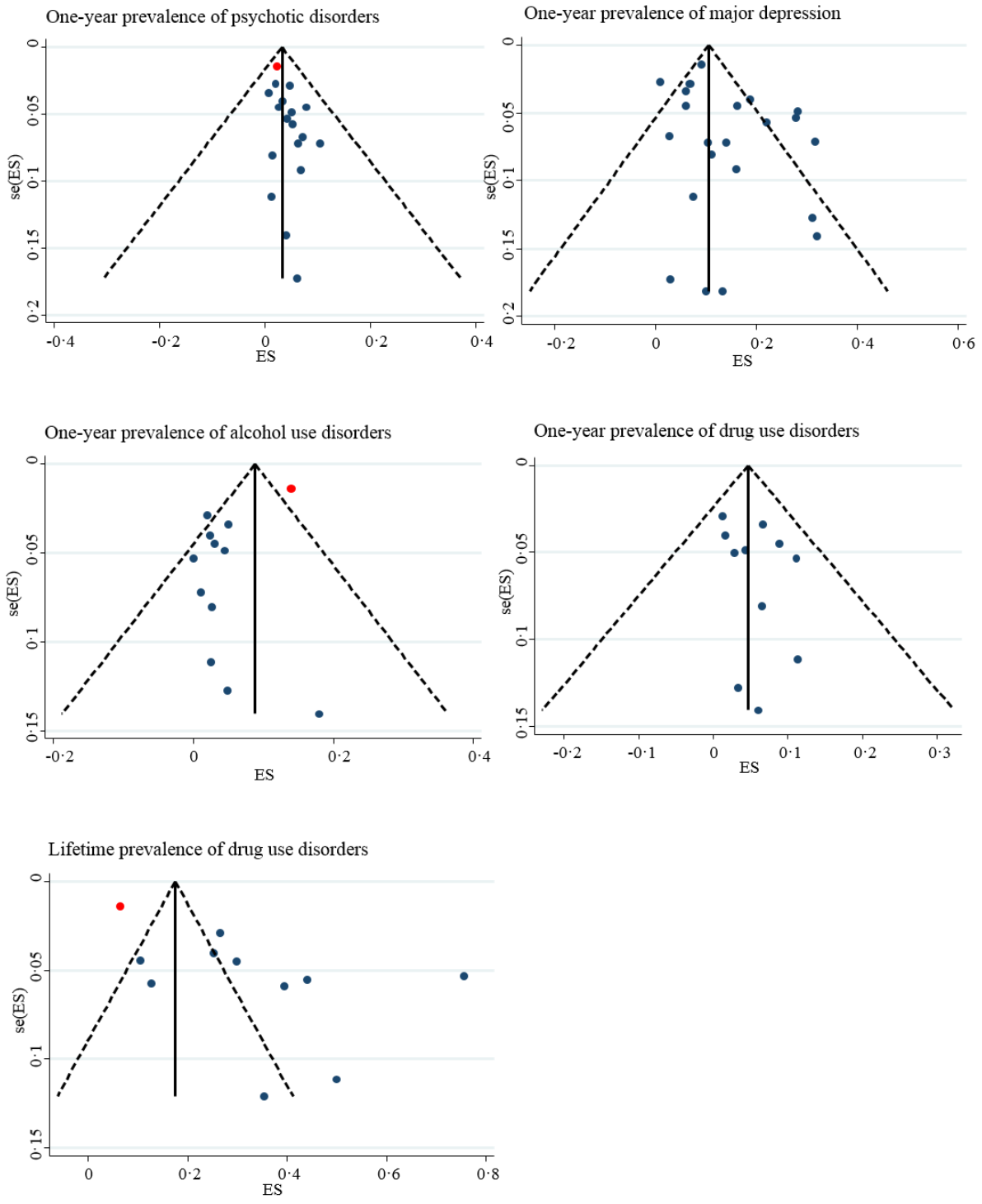
Supplementary Table 5: Meta-regression analysis of study characteristics relating to substance use disorders

	Current alcohol use disorders				Current drug use disorders				Lifetime drug use disorders			
	β	95% CI		p	β	95% CI		p	β	95% CI		p
		lower	upper			lower	upper			lower	upper	
Sex (male vs female)	-0.018	-0.127	0.091	0.718	-0.014	-0.096	0.068	0.704	0.078	-0.227	0.383	0.579
Age (cont.)	-0.009	-0.043	0.026	0.581	0.015	-0.014	0.045	0.265	0.009	-0.027	0.046	0.572
Sample size (n<500 vs n≥500)	0.036	-0.050	0.122	0.369	-0.037	-0.104	0.030	0.242	-0.238	-0.479	0.003	0.052
Time spent in prison (<1 y vs ≥1 y)	-0.0002	-0.189	0.189	0.998	0.020	-0.367	0.326	0.891	-0.108	-0.951	0.735	0.740
Year of data collection (cont.)	0.006	-0.008	0.021	0.343	-0.001	-0.008	-0.007	0.807	-0.008	-0.052	0.035	0.654
Interviewer (mental health professional vs other)	-0.031	-0.139	0.077	0.539	0.056	-0.049	0.162	0.254	0.181	-0.095	0.457	0.172
Diagnostic criteria (DSM vs ICD)	0.033	-0.056	0.122	0.422	-0.051	-0.120	0.017	0.122	-0.154	-0.450	0.141	0.263
Non-response rate (cont.)	-0.001	-0.003	0.002	0.531	-0.002	-0.005	0.001	0.214	-0.004	-0.021	0.014	0.623
Quality of the study (cont.)	-0.024	-0.035	-0.013	0.001	0.002	-0.027	0.032	0.875	0.081	-0.005	0.166	0.062
WHO-regions*	F _(4,7) = 7.47			0.011	F _(4,6) = 0.51			0.733	F _(4,6) = 3.75			0.073
Africa	0.036	-0.120	0.191	0.604					-			
Americas	0.030	-0.102	0.163	0.607					0.171	-0.208	0.551	0.311
Eastern Mediterranean	Ref.								0.627	0.146	1.108	0.019
Europe	-								Ref.			
South-East Asia	0.140	0.010	0.271	0.038					0.091	-0.292	0.475	0.581
Western Pacific	0.025	-0.267	0.317	0.845					0.371	-0.165	0.909	0.141

Bold values are significant (p<0.05).

*Region with the lowest pooled prevalence estimate is taken as reference category.

Supplementary Figure 1: Funnel Plots estimating small sample bias in studies reporting severe mental illnesses and substance use disorders in prison populations in low- and middle-income countries



Estimates are plotted against the standard error of the estimate; red point symbolize estimates excluded for sensitivity analysis.

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