Research paper

Determinants of access to health care for depression in 49 countries: A multilevel analysis

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ABSTRACT

Background: The relative importance of individual and country-level factors influencing access to diagnosis and treatment for depression across the world is fairly unknown.
Methods: We analysed cross-national data from the WHO World Health Surveys. Depression diagnosis and access to health care were ascertained using a structured interview. Logistic Bayesian Multilevel analyses were performed to establish individual and country level factors associated with: (1) receiving a diagnosis and (2) accessing treatment for depression if a diagnosis was ascertained.
Results: The sample included 7870 individuals from 49 countries who met ICD-10 criteria for depressive episode in the past 12 months. A third (32%) of these individuals had ever been diagnosed with depression in their lifetime. Among those diagnosed with depression, 66% reported to have ever received treatment for depression. Although individual factors were more important determinants of access to treatment for depression, country-level factors explained 27.6% of the variance in access to diagnosis and 24.1% in access to treatment. Access to treatment for depression improved with increasing country income. Female gender, better education, the presence of physical co-morbidity, more material assets, and living in urban areas were individual level determinants of better access.
Limitations: Data on other contextual factors was not available. Unmet need was likely underestimated, since only lifetime treatment data was available.
Conclusion: This study highlights major inequalities in access to a diagnosis and treatment of depression. Unlike the prevalence of depression, where contextual factors have shown to have less importance, a significant proportion of the variance in access to depression care was explained by country-level income.

1. Introduction

Despite the worldwide public health importance of depression, it is often not identified or treated adequately (De Silva et al., 2014; Demyttenaere et al., 2004; Ferrari et al., 2013; Rai et al., 2013; Vos et al., 2012; Wang et al., 2007a). In fact, poor access to care has been identified as one of the key challenges for mental health systems in Low-and-Middle Income countries (LMIC) (Patel et al., 2016a).

To improve access to mental health care, it is crucial to understand which individual and contextual factors influence this process.

Traditionally, the focus has been on studying individual determinants of help-seeking and access to care. Previous studies suggest that factors such as low socio-economic status (Bleich et al., 2012) and male sex (Susukida et al., 2015) are associated with decreased service use. Poor mental health literacy (Wei et al., 2015), stigma and fear of disclosure (Clement et al., 2015) and self-reliance (Gulliver et al., 2010), for example, are important barriers to help-seeking. These individual factors also interact with each other, so that stigma impacts some groups, such as men and young people, more than others (Clement et al., 2015).

However, contextual factors, such as country income and economic

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development may also influence access to services. Some studies suggest poorer countries are less likely to offer access to treatment for depression (Demyttenaere et al., 2004; Ferrari et al., 2013; Rai et al., 2013; Thornicroft et al., 2016). For example, in India, only 5% of persons with a common mental disorder had sought help (Sagar et al., 2017), whereas in Japan the corresponding figure is 22% (Ishikawa et al., 2016). Other potentially important contextual factors influencing access to treatment could be the health care system, and more specifically the kind of mental health services available. Considering that no individual-based interventions, such as improving mental health literacy, have succeeded in improving help-seeking, it is particularly important to focus on studying contextual factors (Gulliver et al., 2012).

Cross-country comparisons could potentially clarify the role of these contextual factors after accounting for individual variables. Unfortunately, few studies exist where both individual and contextual variables are available, and when there are, these studies include only a limited number of countries, limiting the possibility to explore the contribution of contextual factors (Kohn et al., 2004; Wang et al., 2007a).

In addition, these determinants may be different for different phases of the help-seeking process, namely obtaining a diagnosis, and receiving treatment. In resource-poor settings, reaching a diagnosis may not necessarily lead to receiving treatment. Most previous studies have focused on either identification or treatment, but not provided a combined assessment of both. Access to obtaining a diagnosis and treatment may have different determinants, particularly in resource-poor settings.

This study aims to examine differences between and within countries in the likelihood of being diagnosed and accessing treatment among persons with depression in order to assess the relative contribution of several individual and contextual level factors in determining access to treatment. In particular, we investigated Gross National Income (GNI) as a determinant of access to health care for depression.

2. Methods

2.1. The WHO World Health Surveys

The World Health Surveys were carried out by the World Health Organisation (WHO) in 2002–2003 in a sample of countries representing all regions of the world (Ustun et al., 2003). The aim of the surveys was to allow worldwide comparisons of health outcomes using valid, reliable and comparable methods. In all participant countries the surveys were implemented using a representative, stratified random and probabilistic multi-stage sampling design of population ≥ 18 years, including institutionalised persons. Questionnaires were developed by the WHO in consultation with international and local experts and translated to local languages. The interviews were conducted after informed consent and performed face to face by trained interviewers. Detailed information about the World Health Surveys including the survey tools, sampling guidelines and procedures, and country statistics, is available elsewhere (http://www.who.int/healthinfo/survey/en/).

The individual response rates ranged between 63% in Israel to 99% in the Philippines, with an overall estimate of 98·5% for the surveys as a whole. We used data from 49 out of 71 countries that had information on all key variables of interest (Supplementary Table 1). These included 14 low-income, 13 middle-lower income, 11 middle-upper income, and 11 high-income countries according to World Bank criteria.

2.2. Independent assessment of depression

People who had suffered from an episode of depression during the past 12 months were identified using the WHO World Mental Health Survey version of the Composite International Diagnostic Interview (CIDI) (Kessler et al., 1998) linked to a validated diagnostic algorithm using the International Classification of Disease 10th (ICD-10) criteria (World Health Organization, 1992). This version of the CIDI does not distinguish between types of depression but it includes all depressive disorders as a single category (major depressive disorder, dysthymia and depression NOS).

2.3. Access to health care for depression

First, we selected those individuals who met criteria for a depressive episode over the last 12 months as mentioned above. Subsequently we used two approaches to estimate access to health care: 1) we estimated the proportion of depressed individuals who also reported having received a diagnosis of depression in their lifetime (have you ever been diagnosed with depression?). This variable most likely implies access to health care in view that only a health professional can confer such a diagnosis. These individuals will be referred to as 'identified cases´. 2) Among those with a confirmed diagnosis of depression, we estimated the proportion that also acknowledged receiving treatment for depression in their lifetime ('have you ever been treated for depression?'). These individuals will be referred to as ´treated cases´. There are a varying definitions and frameworks of 'access to health care', usually involving a range of concepts such us utilization, contact, true and evaluated need, satisfaction, affordability, acceptability, etc. (Andersen, 1995; Bradshaw, 1972; Shengelia et al., 2005; Pechansky and Thomas, 1981). In our study, we opted to consider access in terms of whether those who need care (in our case diagnosis or treatment) receive it or not (Aday and Andersen, 1974; Donabedian, 1972; Tanahashi, 1978). In other words, utilization of healthcare services in case of a normative need, i.e. meeting criteria for a condition, to use health services (Shengelia et al., 2005).

2.4. Individual socio-demographic and clinical measures

2.4.1. Household spending

Participants estimated their total household expenditure in the previous month in their local currency, followed by questions related to expenditure in specific areas including food, housing, and healthcare amongst other expenses. A previous analysis of the World Health Surveys showed the aggregate of the expenditures reported in these areas to be consistent with the total reported household expenditure (Xu et al., 2009). The total monthly household expenditure was divided by the number of individuals in the household to calculate monthly per-capita household spending. For the analysis, we divided individuals into quintiles of household spending for each country, using lower spending as reference.

2.4.2. Material assets index

We used responses regarding ownership of 9 household assets (television, washing machine, dishwasher, mobile phone, fixed telephone, computer, refrigerator, bicycle, and car). Probabilities of a household having each of the above assets for each specific country were calculated. Country specific standardised scores were then calculated for each household reflecting the sum of the complements of the probability of having each asset in that country. We stratified the scores in two categories: below the country-mean and above the country-mean (with a higher number of assets as reference category) (Ferguson et al., 2003; Rai et al., 2013).
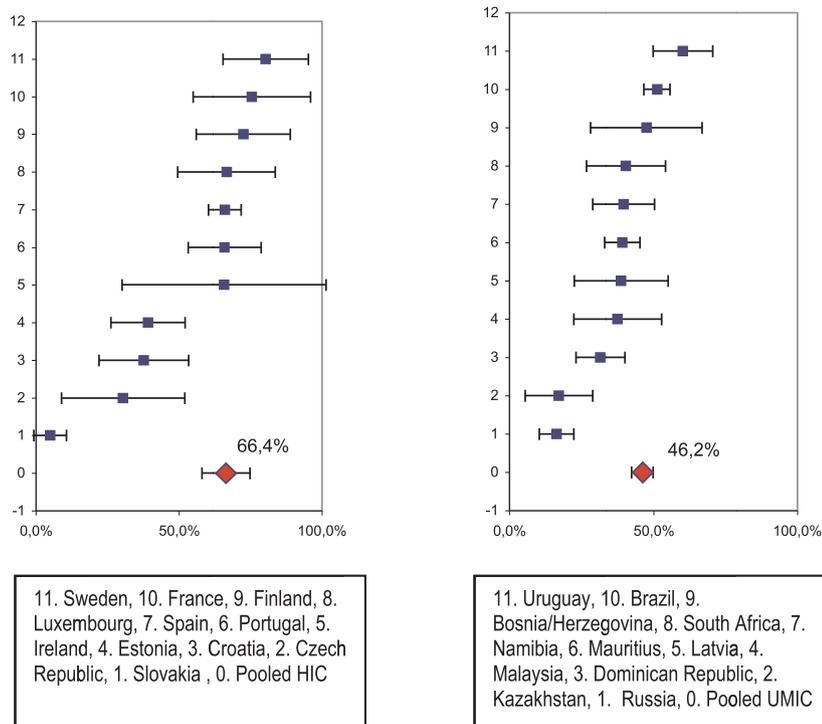
2.4.3. Education

The reported number of years of completed education was categorised into < 8, 8–12, and > 12 years of education.

2.4.4. Occupation

We used three categories: higher level or professionals /managers, other manual and non-manual workers, and those not working for pay.

(a) High-income countries (HIC)   (b) Upper–middle-income countries (UMIC)

11. Sweden, 10. France, 9. Finland, 8. Luxembourg, 7. Spain, 6. Portugal, 5. Ireland, 4. Estonia, 3. Croatia, 2. Czech Republic, 1. Slovakia , 0. Pooled HIC

11. Uruguay, 10. Brazil, 9. Bosnia/Herzegovina, 8. South Africa, 7. Namibia, 6. Mauritius, 5. Latvia, 4. Malaysia, 3. Dominican Republic, 2. Kazakhstan, 1. Russia, 0. Pooled UMIC

(c) Lower-middle- income countries   (d) Low-income countries

13. Swaziland, 12. India, 11. Ecuador, 10. Paraguay, 9. Georgia, 8. Philippines, 7. Tunisia, 6. Ukraine, 5. Pakistan, 4. Morocco, 3. China, 2. Sri Lanka, 1. Cote d'Ivoire, 0. Pooled LMIC

14. DR Congo, 13. Lao PDR, 12. Kenya, 11. Mauritania, 10. Ghana, 9. Zambia, 8. Burkina Faso, 7. Senegal, 6. Chad, 5. Mali, 4. Bangladesh, 3. Malawi, 2. Vietnam, 1. Comoros, 0. Pooled LIC
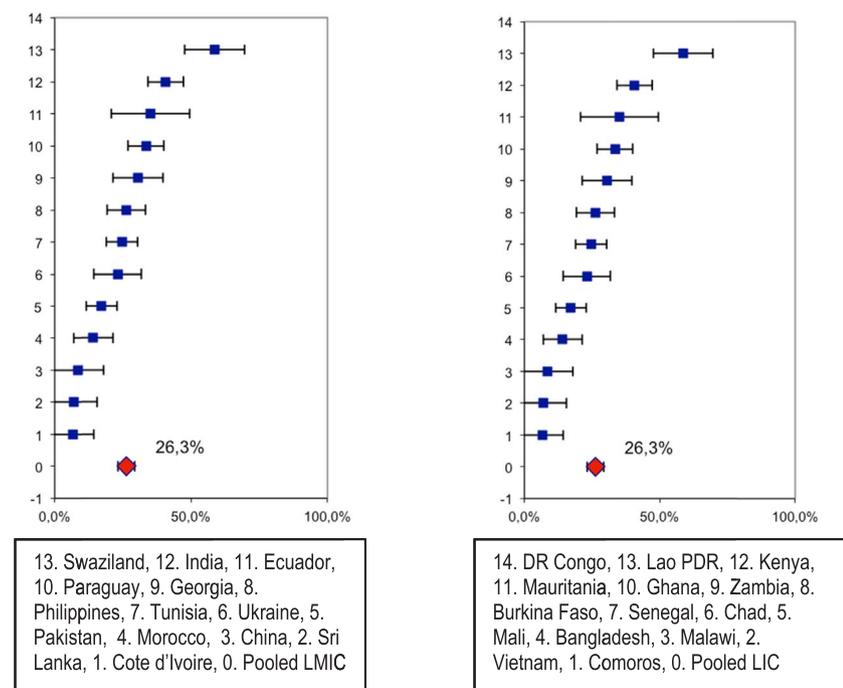
Fig. 1. Estimated country-level proportions of 'identified cases' of depression during the past 12 months, grouped by economic development (World Bank criteria).

2.4.5. Demographic variables

Age, gender, and marital status (currently married or cohabiting, separated or divorced, never married, and widowed) and area of residence (urban or rural) were included as demographic variables.

2.4.6. Physical comorbidity

This variable identified depressed individuals who had also received one or more diagnoses for other chronic diseases (diabetes, angina, arthritis, and asthma). The variable was coded dichotomously.
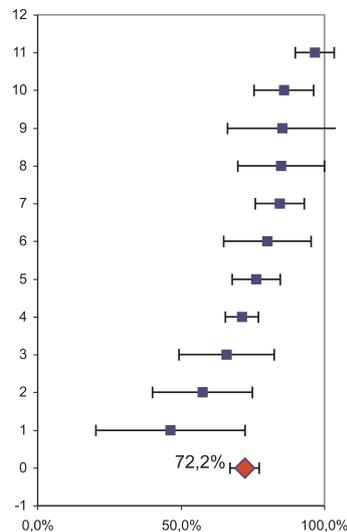
2.5. Country-level measures

2.5.1. Gross National Income (GNI)

We used data from the World Bank (http://data.worldbank.org/

(a) High-income countries (HIC)   (b) Upper–middle-income countries (UMIC)
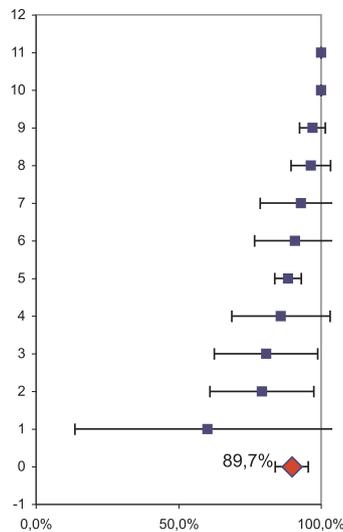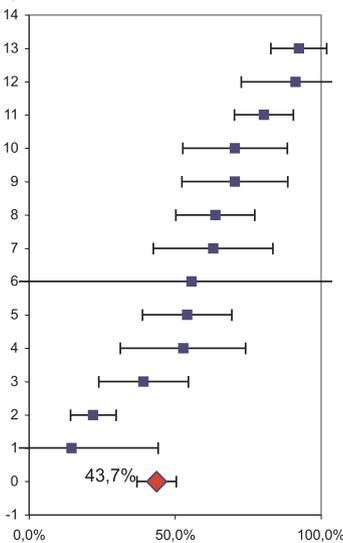

11. Ireland , 10. Croatia, 9. Portugal, 8. Finland, 7. Slovakia, 6. France, 5. Spain, 4. Sweden, 3. Estonia, 2. Luxembourg, 1. Czech Republic, 0. Pooled HIC

11. Kazakhstan, 10. Russia, 9. Bosnia/Herzegovina, 8. Latvia, 7. Uruguay, 6. South Africa, 5. Mauritius, 4. Brazil, 3. Dominican Republic, 2. Namibia, 1. Malaysia, 0. Pooled UMIC

(c) Lower-middle- income countries   (d) Low-income countries

13. Morocco, 12. Cote d'Ivoire, 11. Paraguay, 10. Georgia, 9. Pakistan, 8. Tunisia, 7. Ecuador, 6. Sri Lanka, 5. Swaziland, 4. Ukraine, 3. Philippines, 2. India, 1. China, 0. Pooled LMIC
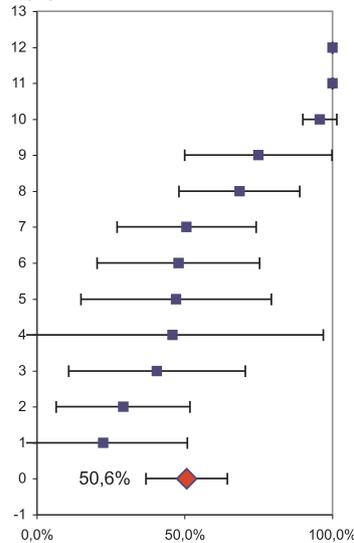
12. Senegal, 11. Mali, 10. Congo Republic, 9. Mauritania, 8. Kenya, 7. Lao PDR, 6. Chad, 5. Zambia, 4. Malawi, 3. Burkina Fasa, 2. Bangladesh, 1. Ghana, 0. Pooled LIC

Fig. 2. Estimated country-level proportions of 'treated cases' among 'identified cases' of depression during the past 12 months, grouped by economic development (World Bank criteria).
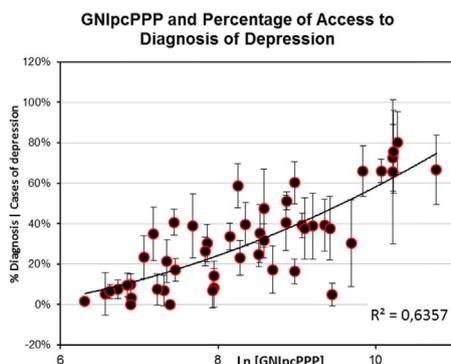
indicator) to compile the 2002 GNI per capita for each country in US$ adjusted according to purchasing power parity (PPP). GNI measures the total value produced in the country, plus income from other sources, less similar payments made to other countries (Lequiller and Blades, 2006). In our data, this varied from US$500 in Ethiopia to US$47,730 in Luxembourg. We log-transformed this variable for analysis in an attempt to linearize its relationship with depression (Lynch et al., 2000).

2.6. Analysis

All analyses involved only the sub-sample of individuals classified as with an episode of depression during the last 12 months according to ICD-10 criteria. Only persons with complete data were included in the analyses. Supplementary Table 8 presents a comparison of the results with complete data and including those with some missing data.

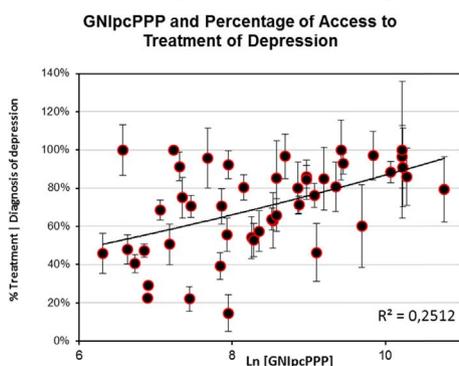Firstly, the weighted percentage of access to mental health care

Fig. 3. The proportion of (a) 'identified cases' among persons with depression during the past 12 months, and (b) 'treated cases' among the 'identified cases' during the past 12 months, by country-level measures of Gross National Income per capita PPP.

services (i.e. identification and among these those who also reported treatment) was calculated for each country. Weights represented the inverse probability of selection of an individual in each country. These estimates were calculated using the software R, version 2.10.1.

Secondly, we estimated the relative importance of country level factors on access to health care (diagnosis and treatment). For this, we carried out multilevel logistic regressions and estimated two main indices: Variance Partitioning Coefficient (VPC) and Median Odds Ratio (MOR). The VPC quantifies the proportion of country level variance over the total model variance. We used the 'latent variable method' in which the variance of the lower level (in our case the individuals) is fixed as equal to 3.29 (Merlo et al., 2006; Rasbash et al., 2009). The VPC is commonly reported in multilevel analysis, but may vary depending on the prevalence of the outcome, making comparisons difficult. In order to overcome this difficulty, we estimated the MOR, which allows better comparisons when the prevalence of the outcome differs. The MOR represents "the median value of the odds ratio between the country at highest risk and the country at lowest risk when randomly picking out two countries" (Merlo et al., 2006). The MOR can be interpreted as the median change in likelihood of accessing treatment if an individual moved to another country. Higher MOR indicates larger differences between compared countries.

In all instances we performed multilevel logistic regression models and reported odds ratios (OR) with 95% confidence intervals (95%CI). Crude and adjusted odd ratios were estimated. Interactions among variables were also explored. All the multilevel regression models were estimated initially using Restricted Iterative Generalised Least Squares (RIGLS) methods and then using Markov Chain Monte Carlo procedures using MLWin 2.8. All the models were run until when we achieved at least an effective sample size of 200 (usually more than 100,000 chains). Since MLWin when operating in MCMC mode does not allow the use of sampling weights, we undertook a sensitivity analysis to

evaluate the impact of not using weights in the multilevel analysis. In order to assess this we carried out logistic regression models including weights using the R software. In an attempt to compensate for the absence of a multilevel structure we included the variable country in these models as a fixed effect and re-estimated all models where it was possible to do so (Bell and Jones, 2015).

3. Results

Complete data for those who met criteria for ICD-10 depressive episode during the last 12 months was available for 7870 individuals living in 49 countries, corresponding to 6.9% [95%CI 6·7–7·2%] of the weighted eligible sample (133,501 persons). Including cases with missing values in some of the variables, there were 172,513 persons of whom 10,866 had depression, equivalent to a weighted 7,0% [6.7–7.3] prevalence of depression. In the analyses, only persons with no missing data were included.

Out of these depressed people, 2342 (32.0% [95%CI 29.8–34.2%]) reported having received a diagnosis of depression in their lifetime ('identified cases'), and 1618 (21.9% [95%CI 19.8–24·0%] of all cases or 65.7% [95%CI 61.8–69.6%] of the ones who had received a diagnosis) acknowledged they had accessed treatment ('treated cases'). Fig. 1 shows the proportion of 'cases identified' whilst Fig. 2 the proportion of 'cases treated' among the 'identified cases' by countries grouped according to the World Bank classification based on Gross National Income. The same data is presented numerically in Supplementary Tables 5 and 6. Supplementary Table 7 presents the proportion of 'treated cases' out of all cases of depression. For both 'identified' and 'treated' cases, a large variability between countries grouped according to income levels was observed. In addition, the figures display a trend indicating less access to health care for depression among countries or group of countries with lower incomes. Country-correlation between 'identified' and 'treated' cases was low (r = 0.40, p-value = 0.004).

These trends were further confirmed when we plotted the log-relationship between per-capita Gross National Income by country and the proportion of 'identified' and 'treated' cases (Fig. 3a and b). The correlation was stronger for 'identified cases' but still persisted for 'treated cases'.

When examining individual variables, female sex, being separated or divorced, higher levels of education, or having any co-morbidity were positively associated with having been 'identified' as case of depression. On the contrary, those with a material assets index below the country-mean, widowed, or living in a rural area were associated with a lower likelihood of being 'identified' as cases of depression (Table 1).

Among those 'identified' as cases of depression, those with higher spending levels were more likely to receive treatment. Older people also had higher odds of receiving treatment. Individuals belonging to the group below the country-mean on the material assets index and having co-morbidity were less likely to have received treatment for depression (Table 1).

We observed a large variance among countries for both 'identified' and 'treated' cases. The VPC among countries represents 27·6% (country variance 1.25 (SE 0.27); MOR 2·90 [95%CI 2.24–3.57]) and 24·1% (country variance 1.04 (SE 0.27); MOR 2·64 [95%CI 1.97–3.29]) for 'identified' and 'treated' cases respectively. These values show that approximately a quarter of mental health care access depends on country level factors, whilst the rest is attributable to individual variability. The MOR indicates that the median difference in the odds of access to identification and treatment between two countries are on average 2.9 and 2.6-fold.

The VPC for treated cases ranged from 5.1% (country variance 0.18 (SE 0.22); MOR 1.49 [95% Creditable Intervals 0.62–2,11]) for high-income countries to 26.6% (country variance 1.19 (SE 0.64); MOR 2.82 [95% Creditable Intervals 0.78–4.42]) in low-income countries, indicating increasing importance of country level factors with decreasing

Table 1
Individual-level socioeconomic correlates of access to diagnosis* and treatment** of depression: multilevel logistic regression analysis of pooled sample.

	Access to Diagnosis of Depression[a] Crude variables		Access to Diagnosis of Depression[a] Adjusted variables		Access to Treatment of Depression[b] Crude variables		Access to Treatment of Depression[b] Adjusted variables	
	OR	CI(2.5 − 97.5%)	OR	CI(2.5 − 97.5%)	OR	CI(2.5 − 97.5%)	OR	CI(2.5 − 97.5%)
Age (years)	1.01	1.00–1.01	1.00	1.00–1.01	1.01	1.00–1.01	1.01	1.01–1.02
Sex (males reference)	1.34	1.19–1.51	1.32	1.16–1.50	1.15	0.92–1.44	1.24	0.98–1.58
Place (Urban zones reference)	0.72	0.64–0.81	0.78	0.69–0.89	0.82	0.66–1.02	1.03	0.81–1.31
Currently married or cohabiting	1.00	–	1.00	–	1.00	–	1.00	–
Separated or divorced	1.27	1.04–1.55	1.26	1.03–1.54	1.18	0.83–1.68	1.15	0.8–1.67
Never married	0.92	0.79–1.08	1.01	0.85–1.20	0.78	0.59–1.04	0.89	0.66–1.21
Widowed	0.94	0.81–1.10	0.79	0.66–0.93	1.03	0.78–1.37	0.91	0.66–1.25
Education (< 8 years)	1.00	–	1.00	–	1.00	–	1.00	–
Education (8 − 12 years)	1.06	0.92–1.22	1.09	0.93–1.27	1.35	1.04–1.77	1.23	0.91–1.64
Education (> 12 years)	1.30	1.08–1.55	1.28	1.03–1.58	1.71	1.21–2.42	1.43	0.96–2.15
Material-Assets (Index > than mean reference)	0.80	0.71–0.90	0.85	0.75–0.97	0.55	0.44–0.69	0.65	0.51–0.83
Quintile 5 (lowest spending)	1.00	–	1.00	–	1.00	–	1.00	–
Quintile 4	0.92	0.76–1.11	0.90	0.75–1.09	1.15	0.82–1.60	1.11	0.78–1.56
Quintile 3	1.05	0.87–1.26	0.95	0.79–1.15	1.60	1.15–2.23	1.54	1.100–2.17
Quintile 2	1.07	0.90–1.27	0.96	0.80–1.15	1.78	1.29–2.47	1.57	1.12–2.21
Quintile 1 (highest spending)	1.40	1.18–1.66	1.18	0.99–1.42	2.21	1.62–3.03	1.81	1.29–2.54
Occupation: High professionals	1.00	–	1.00	–	1.00	–	1.00	–
Non manual and manual workers	0.79	0.59–1.04	0.99	0.73–1.35	0.73	0.43–1.24	1.24	0.68–2.29
Occupation: Not Working for pay	0.94	0.71–1.24	1.07	0.79–1.44	0.67	0.40–1.12	1.08	0.60–1.97
Comorbidity	2.05	1.84–2.30	2.08	1.85–2.34	0.84	0.68–1.02	0.79	0.63–0.98
	n level 1	7870	n level 1	7870	n level 1	2342	n level 1	2342
	n level 2	49	n level 2	49	n level 2	47	n level 2	47

CI: Confidence Interval.

[a] . Access to Diagnosis of Depression: life-time access to Diagnosis of cases with depression during last year.

[b] . Access to Treatment of Depression: life-time access to Treatment of cases with diagnosis in those had depression during last year.

country income, whereas the VPC did not vary in a consistent way for identified cases across country income groups (Supplementary Tables 3 and 4).

4. Discussion

This study using data from a large standardised multi-country survey including 49 countries confirms that the majority of individuals with depression are not identified and that a significant percentage of those identified with depression go untreated. Approximately one third of people who had a depressive episode in the past 12 months had been identified, and only around a fifth received treatment during their lifetime. Our findings also show a large gradient of access to treatment, from 7·1% in low-income countries to 66·4% in high-income countries, with an important variability within each country income group. As in previous studies, individual level variables seem most important in determining access to mental health care; in particular, socio-economic status is a powerful determinant of access to health care for depression. A large proportion of the variance in access to mental health services was explained at country level. This is in contrast with lower variance coefficients in the prevalence of depression across countries we have reported previously (Rai et al., 2013).

Notably, both access to diagnosis and treatment were inquired for lifetime, and therefore the treatment gap for the current episode of depression is likely underestimated.

4.1. Access rates in earlier studies

These results are reasonably consistent with previous studies using different methodologies (Kohn et al., 2004; Wang et al., 2007a) but our findings show even more contrasting differences across countries with different gross national incomes. The World Mental Health Survey (WMHS), including 15 countries, found a range of access to health care

for depression between 8.1% for middle and low-income countries to 29.3% for high-income countries (Ormel et al., 2008). Further, only 16.5% received treatment that was considered minimally adequate (Thornicroft et al., 2016). A literature review of 37 national and community-based studies also found wide variability in treatment access for depression across countries (Kohn et al., 2004). However, in this review of a heterogeneous sample of studies, the treatment gap for major depression was 56%, with wide variation, similar to our findings. No analysis according to levels of economic development of the countries involved was performed, but the gap was smaller in the European region (45%) than in the Americas (57%) or Africa (67%). The higher average rate of access to mental health care in this study, compared to our finding, is probably explained by the inclusion of mainly middle- and high-income countries.

4.2. Access to diagnosis vs. access to treatment

The WMHS used different definitions of access to treatment, including any service utilization in past 12-months, and separately attending to follow-up visits (at least two visits: one for diagnosis or assessment, and other for onset of treatment or control) (Wang et al., 2007b). In keeping with the findings of this previous study, we found that a first contact with health services does not always guarantee access to treatment. Moreover, the country-correlation between 'identified' and 'treated' cases was lower than expected, further supporting our findings.

In a few countries, the coverage for treatment was estimated at 100% among those identified, but this needs to be interpreted with caution because of low number of observations. In most countries, however, a large proportion of those identified did not receive treatment. This phenomenon could be related to lack of resources allocated for mental health to provide treatment, patients' failure to follow up on recommended care, or other reasons of either the patient or health care

provider to refuse treatment, such as negative attitudes towards depression. Unfortunately, this dataset does not provide further explanation for this discrepancy.

4.3. Contextual factors

The differences between countries in access to diagnosis or treatment for depression were larger than differences in prevalence of depression: the Mean Odds Ratio (MOR), which represents the median difference between two countries, was 2.0 for prevalence of depression in our previous study (Rai et al., 2013), and 2.6 and 2.9 for access to health care (treatment and identification, respectively). This suggests that country-level factors have less influence on the prevalence of depression, but are more important determinants of access to health care.

The relative contribution of country level factors as measured by the Variance Partitioning Coefficient (VPC) was high, 28% for 'identified' and 24% for 'treated' cases. This means that country level factors, such as country income which is likely to impact significantly in the coverage and quality of health systems, might explain approximately one quarter of the variability in access to health care for depression, whereas individual factors, such as individual level of education or being separated or divorced explained the remaining three quarters of this variability. A much larger proportion of the variance in access to health care for depression was explained at country level than when examining variations in the prevalence of depression, where country-level factors explained only 13.5% of the variance (Rai et al., 2013).

The impact of country-level factors on access to treatment appeared to differ by country income level: the MOR for high-income countries was 1.5, while for low-income countries it was 2.8. Nevertheless, for access to diagnosis, the MOR was relatively homogeneous across country income groups. Additionally, the correlation we found between the proportion of 'identified cases' of depression and country GNI was strong, and this correlation remained for access to treatment among those 'identified cases'.

This implies that country income level may have a differential impact at different stages in the pathways to care, either access to diagnosis or treatment. However, the heterogeneity of access, especially to treatment, was higher in low-income countries than in the other countries: within the same range of low GNI, there were countries with relative high but also low access to treatment. This heterogeneity observed only in low-income countries and only in treatment could be explained by the fact that access to treatment is more sensitive to arrangement of the health care delivery in contexts of similar economic resources (Mills, 2014). This could be especially significant in low-income countries where the resources are scarce and small improvements can have a large impact.

4.4. Individual factors

However, individual factors still remain more important in explaining access to health care than country-level factors. This is consistent with findings from the WMHS where individual factors, such as attitudinal barriers, were more important barriers to help seeking than structural barriers, such as costs or unavailability of appointments (Wang et al., 2007a).

Some individual variables were associated with both higher prevalence in our previous study and better access in this study, whereas others were associated with higher prevalence but lower access. For instance, women and separated or divorced persons had both increased prevalence and access to treatment. However, having lower levels of education and material assets were associated with increased prevalence and lower access, a combination that accentuates the burden of depression.

Increased spending (proxy of income) was somewhat surprisingly associated with higher prevalence rates in our previous study, and strongly associated with access to treatment although not for detection

in the present study. This variable is complex to interpret in so far as reflecting not only income levels but also needs and decisions about spending. Of the different measures of SES, higher education was associated with detection, but higher spending and better assets were associated with treatment. These findings suggest that socioeconomic status might impact access in different ways: education might allow the person to recognise symptoms of depression as something warranting medical attention, whereas material assets and income provide the means to pay for treatment.

Comorbidity with physical conditions was another individual variable associated with access, positively for detection and negatively for treatment. Previous literature has also shown controversial results exploring association between comorbidity and access (Menear et al., 2015). It is possible that persons with depression and other medical conditions are identified when they are in contact with health services for their other conditions, but treatment options are more limited due to their health status. However, this finding requires further study and clarification.

5. Strengths and limitations

Among the strengths of this study, the large sample size representative of countries across all levels of economic development is noteworthy. Depression was identified using a validated questionnaire embedded in a face-to-face interview, and various individual level socioeconomic measures were available. We used multilevel methods, which are the most appropriate approach to account for any country level clustering of observations, and simultaneously study contextual and individual determinants of access to care for depression.

Despite the use of comparable methods across the countries, it is possible that people in different countries may conceptualise and answer survey questions differently and therefore measurement biases, both in the estimates of access to care for depression and its determinants, cannot be ruled out (Epidemiology, 2000; Phillips et al., 2009). In particular, it is possible that in some contexts health care providers might not refer to the condition as 'depression', and therefore the self-report on receiving diagnosis and/or treatment for depression might not be reliable. Similarly, it is possible that some persons reported to have been diagnosed with depression, even if the assessment was given by someone else than a medical professional. If this were the case, we would be overestimating the access to obtain a diagnosis of depression by a health professional. Further, the timeframe for diagnosis in the interview (12 months) and for access to care (lifetime) were different, because no data on access during the past 12 months was available. This definition underestimates the unmet need, as treatment may have been received during a previous episode instead of the current one. On the other hand, we did not consider those who had received treatment without having been diagnosed. However, they were a small group: in total 35 persons in the whole dataset

Although we analysed income data at a country level, there might be other contextual factors, such as regional differences within the countries or factors related to health care systems, which may contribute to the unexplained variance. We were not able to include all countries that participated in the World Health Surveys due to missing data; however, the 49 countries included represent all regions and levels of income. Among the included countries, we could not rule out systematic patterns of missingness, which could lead to selection bias.

Finally, the data were collected in 2002–2003, and may not entirely represent current situations in some countries; nevertheless, we are not aware of any major improvements at a global scale in terms of access to care for depression since then. This is the most recent available dataset of this magnitude, and as such best suited to model global patterns of access to care for depression.

6. Conclusions

Whether or not a depressed individual has access to professional help is mostly determined by individual factors, socio-economic status prominent among these. However, also contextual factors, especially country income, seem to play an important role, which increases in importance with reducing country income. This highlights the double burden of low individual socio-economic status and living in a low-income country, both of which contribute to a much lower access to help in the face of a mental disorder.

A priority in global mental health is "to massively increase opportunities for people with mental, neurological and substance use disorders to access services without the prospect of discrimination or impoverishment and with the hope of attaining optimal health and social outcomes" (Patel et al., 2016a). Several international efforts exist to support poorer countries in delivering effective, evidence-based mental health care (Patel et al., 2016b; Shidhaye et al., 2015). It is to be hoped that these statements and efforts will materialize in the years to come.

Access to data

This paper uses data from the World Health Organization (WHO) World Health Surveys, which were gratefully received from the WHO. PZ had full access to the data and takes overall responsibility for the accuracy of the data analysis.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at http://dx.doi.org/10.1016/j.jad.2018.02.092.

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