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Depression and Type 2 Diabetes in Low and Middle Income Countries: A Systematic Review

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Abstract

Eighty percent of people with type 2 diabetes reside in low and middle-income countries (LMICs). Yet much of the research around depression among people with diabetes has been conducted in high-income countries (HICs). In this systematic review we searched Ovid Medline, PubMed, and PsychINFO for studies that assessed depression among people with type 2 diabetes in LMICs. Our focus on quantitative studies provided a prevalence of co-morbid depression among those with diabetes. We reviewed 48 studies from 1,091 references. We found that this research has been conducted primarily in middle-income countries, including India ($n=8$), Mexico ($n=8$), Brazil ($n=5$), and China ($n=5$). There was variation in prevalence of co-morbid depression across studies, but these differences did not reveal regional differences and seemed to result from study sample (e.g., urban vs rural and clinical vs population-based samples). Fifteen depression inventories were administered across the studies. We concluded that despite substantial diabetes burden in LMICs, few studies have reviewed co-morbid depression and diabetes. Our review suggests depression among people with diabetes in LMICs may be higher than in HICs. Evidence from these 48 studies underscores the need for comprehensive mental health care that can be integrated into diabetes care within LMIC health systems.

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Introduction

Two Lancet series published in 2007 and 2011 have drawn attention to recognize global mental health. The articles not only identified mental health as a cause of 14% of the global burden of disease but also emphasized the role of mental health in physical health conditions (1). However, while they provided evidence for co-morbidities between mental and physical health, including depression and type 2 diabetes, much of the evidence came from high-income countries. To date, few studies have systematically evaluated the role of mental health problems in chronic diseases in low and middle-income countries (LMICs).

The International Diabetes Federation (IDF) estimated that 382 million people had type 2 diabetes in 2013 (2). Diabetes is increasing in every country, but eighty percent of people with diabetes live in LMICs and around half of those are undiagnosed (2). In 2011, the IDF projected that diabetes alone resulted in USD 465 billion dollars in healthcare expenditures, and eleven percent of all healthcare expenditures in adults between 20 and 79 years of age (3). However, they failed to consider the relative import of depression and other common mental disorders in these health expenditures. Indeed, meta-analyses from high-income countries indicate that people with diabetes are twice as likely to be depressed when compared to people without diabetes (4) and that such depression contributes not only to increased diabetes disability and morbidity (5,6) but also to increased health system burden (7,8).

In high-income countries there is a documented bidirectional relationship between depression and type 2 diabetes (8–12). While living with diabetes contributes to depression (13,14), depression among those with diabetes is associated with non-adherence to diabetes treatment (15–18), increased diabetes complications,(19) and poor glycemic control (20). Biological and behavioral pathways also link depression to diabetes via neurohormonal pathways, alterations in glucose transport, increased immuno-inflammatory activation, behavioral pathways, and use of anti-depressants (21–23). To date there is no concrete evidence to confirm the bidirectionality of depression and diabetes in LMICs, but one may hypothesize that a similar relationship holds true even in LMICs.

Similarly, little is known about who is most affected by depression and diabetes in LMICs or how social and health care experiences affect disease outcomes. Meta-analyses from high income countries reveal that low-income groups with diabetes do not necessarily have higher rates of acute depression when compared to the general population (24). Rather, they suggest that poor access to depression care and the resultant chronicity of psychological distress among poorer people with diabetes contributes to adverse health outcomes (25). Indeed, these meta-analyses suggest that co-morbid depression among those with diabetes is more common among those who are poor, women, older age, overweight, and smoke (26, 27). Understanding who is most affected by co-morbid depression among those with diabetes in LMICs is particularly important due to the residual effect of the double burden of diseases. In many cases, those with severe neurological problems, such as schizophrenia, lack sufficient mental health care (28) so providing depression care alone and together with diabetes care remains a challenge.

The relationship of diabetes and depression has not been reviewed in detail from LMICs. We conducted a systematic review of quantitative studies that have documented co-morbid depression among people with type 2 diabetes in LMICs in order to situate the global problem of co-morbidity on the map.

Methods

Search strategy

We searched Ovid Medline, PubMed, and PsychInfo databases, using Medical Subject Heading (MeSH) terms (or equivalent terms for PsychInfo) in February and March 2012 for published peer-review journal articles. We used combinations of the following MeSH terms: “Diabetes Mellitus” or “Diabetes Mellitus, Type 2,” and “Depression” or “Depressive Disorder.” We limited the broad search by including: NOT “United States.” We then reviewed all article titles in order to exclude those studies conducted in high-income countries according to the World Bank’s Human Development Index (HDI). Then, we repeated the search in Ovid Medline and PubMed with MeSH terms “Diabetes Mellitus” or “Diabetes Mellitus, Type 2”, and “Depression” or “Depressive Disorder”, and each country listed as a LMIC according to the HDI. For example, “Mexico” was used as a MeSH term. All countries in these categories had an HDI score of equal to or lesser value than 0.783 ($n=140$ countries). The reference lists of previous meta-analyses and selected articles were also screened. There was no date limitation to the study; the earliest study found was published in 1996 but the majority of studies were conducted in the past ten years.

We repeated the country-specific search in August 2012 in order to prevent oversight of new articles published between March and August 2012. Eleven relevant articles were published during this time; eight of these were included in the review.

We included studies from a low- or middle-income country that reported:

1. Type 2 diabetes;
2. Depression; and/or
3. The percentage of depressed people with type 2 diabetes;
4. The sample was in a low- or middle-income country; and
5. A further requirement was a clear description on how diabetes and depression were diagnosed.

We excluded studies that:

1. Did not mention a co-morbidity of depression and diabetes;
2. Focused only on high-income countries according to the HDI;
3. Focused on caregivers as opposed to patients; and
4. Evaluated people with type 1 diabetes only.

Identification of studies

Using the search methods above (Figure 1), two independent reviewers (EM and RS) screened 1,091 titles and removed studies from the list that were “not low or middle income country,” “not type 2 diabetes”, and “no analysis of depression” ($n=986$). The first author then fully reviewed 100 abstracts and the third author reviewed the decision for full article review according to the five dimensions described below. The authors discussed discordant results to reach agreement. Having obtained the full articles of 60 studies, an additional 12 articles were excluded because they did not provide sufficient data around the proportion of people with type 2 diabetes who were depressed.

Analysis

We have followed the PRISMA guidelines for reporting the findings of this review (28). Data from the articles to be included in the full text review were extracted into a spreadsheet ($n=100$). Information related to the following characteristics was collected: study characteristics (author, year of publication, region, country, study sample), demographics (percentage women, age), diabetes measurement (such as self-report or clinical measure), and depression (prevalence and depression inventory used). Because of the variation in how co-morbid depression was presented (odds ratios, relative risk, and correlation coefficients), we found the most consistent report was prevalence of depression co-morbidity.

Results

Overall 1,091 articles were extracted from Ovid Medline, PubMed, and PsychInfo (Figure 1). Once duplicates were discarded ($n=162$), 929 titles were reviewed. As a result of title review 829 articles were discarded because it was evident either that: 1) depression was not evaluated among people with type 2 diabetes, and 2) the study was conducted in a high-income country according to HDI. Of the 100 abstracts screened, twenty countries indicated that research had been conducted on depression and diabetes co-morbidity and two studies evaluated depression and diabetes in multiple countries (as WHO commissioned articles). We discarded forty of these studies that did not provide a clear analysis of depression prevalence among people with type 2 diabetes. We finally reviewed 60 full articles and discarded 12 articles because either no percentage or n value was provided for people with depression among those with type 2 diabetes. We excluded two articles because we could not access English-language manuscripts (originally in Russian), although the first author reviewed one Spanish-language article.

A total of 48 published articles representing fifteen countries were analyzed. Among these, four articles represented only two separate studies; therefore, the estimates of co-morbid depression among people with diabetes from these studies are presented as one estimate (one estimate in China, another in Brazil). Table 1 shows that much of the research on the co-morbidity has been conducted in middle-income countries, including India ($n=8$), Mexico ($n=8$), Brazil ($n=5$), and China ($n=5$), where there also are the greatest burden and prevalence of diabetes. Table 2 indicates that there was variation in prevalence of co-morbid depression among people with diabetes across the dataset (lowest: 2% in Brazil; highest: 84% in India) and shows that most estimates were between 25 and 45 percent (with an average of 35.7% across all studies).

Sub-Saharan Africa

Five Sub-Saharan African studies were included in this review (Table 2). One semi-rural clinic-based study in South Africa found 46 percent of people with diabetes were depressed. Four urban clinic-based studies indicate that between 15 and 30 percent of those with diabetes are depressed in Nigeria.

East and South Asia

Nineteen studies were evaluated from East and South Asia (Table 2), more than any other region. Three urban clinic-based studies conducted in Bangladesh indicate that around one-third of those with diabetes have co-morbid depression. Five urban clinic-based studies in China indicate a similar prevalence, but present more variability (highest was 39.2 percent compared to 23 percent was the lowest value). The eight studies in India present data from both urban and rural populations. Of the six urban clinic-based studies, between one-fourth and one-third of the participants with diabetes were depressed; however, these studies demonstrated great variability (highest was 84 percent and lowest was 16.9 percent). Two

urban population-based studies were conducted in Chennai (by the same research group) and suggest slightly lower rates with the same depression inventory, at 19.7 and 23.4 percent. Three studies in Pakistan show great variation both in type of study and prevalence rates: one urban clinic-based study presented 43.5 percent, one urban population-based study presented 59.5 percent, and one rural population-based study presented with 14.7 percent.

Europe and Central Asia

Three urban clinic-based studies were evaluated from Europe and Central Asia, and this was limited due to foreign-language publications (Table 2). Two studies in Russia and one in Turkey report between 40 and 50 percent prevalence of co-morbid depression among people with diabetes.

Latin America

Eleven studies were examined from Latin America (Table 2), and these studies were conducted in the high-middle income countries of Brazil and Mexico. Five studies were conducted in Brazil, for which two urban clinic-based studies report around 20 percent prevalence of co-morbid depression among people with diabetes. In contrast, another study reported only 2 percent prevalence. An urban population-based study reported a higher prevalence at 32 percent. Eight studies were conducted in Mexico and all of these studies indicated that co-morbid depression among people with diabetes was more than one-quarter of their samples. Six of these studies were conducted in urban clinical settings and the range of prevalence was from 27.4 to 63 percent. One rural-based study surveyed a population and found co-morbid depression among 40.5 percent of those with diabetes.

Middle East

Seven studies were evaluated from the Middle East (Table 2). One urban clinic-based study from Egypt suggests that 32 percent of those with diabetes have co-morbid depression. Four Iranian studies were conducted in urban clinical settings and revealed not only high prevalence but also discrepancies associated with depression inventories. While one study reported 70 percent, a second reported 50 percent, and third reported 43.4 percent depression. The final study found 47.6 percent of the sample was depressed according to the PHQ-9 compared to 61.6 percent with the CES-D. An urban clinic-based study in Iraq found that 40 percent of people with diabetes only were depressed, compared to 57 percent of people with both diabetes and hypertension. Urban clinic-based studies in Jordan and Oman estimated that around 20 percent of their samples had co-morbid depression.

Depression Inventories

Table 3 shows fourteen depression inventories and one targeted question utilized across the 48 studies evaluated for this review. The Beck Depression Inventory was utilized in more than one-quarter of the studies ($n=13$). Seven studies used one form of the Patient Health Questionnaire (PHQ-brief, PHQ-8, PHQ-9, and PHQ-12), five studies used the Zung self-rating depression scale, four studies used the Center for Epidemiological Surveillance Depression Scale, and three studies used the Hospital Anxiety and Depression Scale. The other inventories were used in one or two studies.

Discussion

In the next twenty years type 2 diabetes is projected to rise by 20% (2). Most of these new diabetes cases will occur in LMICs. Although traditionally affluent populations have been afflicted by diabetes in these contexts, there is evidence of increased obesity and diabetes incidence and prevalence among lower income groups in LMICs (29), which will introduce

new challenges for public health. For example, not only does diabetes in India afflict more than 9% of the population but also a socioeconomic reversal of diabetes distribution indicates a growing proportion of diabetes incidence and prevalence among the middle-class and working poor (30). These demographic shifts pose problems for lower income groups in urban India who experience not only higher rates of depression and social stress compared to the affluent but also maintain lower diabetes knowledge and poorer access to diabetes care (31). Indeed, it may be that, as demonstrated by Table 1, in LMICs with the highest diabetes burden, such as India, Brazil, Mexico, and China, the interface between depression and physical conditions such as diabetes pose one of the greatest public health challenges in the coming decade.

What is striking about this review is how few studies have examined depression comorbidity among people with diabetes in LMICs despite the disproportionate global burden of diabetes existing in these nations. In contrast, the comorbidity between depression and diabetes in high-income countries has been a major focus of the diabetes literature. More than a dozen systematic reviews have addressed the comorbidity in the last decade, not only documenting that one in four people with diabetes in high income countries are depressed³ but also debating directionality between the two conditions (9,10). Only one review addressed the problem of co-morbidity of depression and diabetes in LMICs (32). However, this review not only lacked a systematic analysis of the comorbidity in global perspective but also overly generalized heterogeneous findings. The review lacked nuance in recognizing that there are important differences in the distribution of diabetes and depression between high-income countries, where most studies have taken place, and LMICs, where the greatest diabetes burden resides. Moreover, it fails to attend to the fact that within these countries, different groups are afflicted not only by diabetes but also depression. The present review illustrates where and how many studies have been conducted in LMICs and emphasizes the variability of epidemiological distribution of diabetes and/or depression between or within nations.

The review suggests that prevalence of depression among people with diabetes might be higher in LMICs when compared to high-income country data. Despite variation of depression prevalence among people with diabetes between studies and countries, synthesis across the 48 studies indicates between 25 and 45 percent prevalence with an average of 35.7%. These data are significantly higher than meta-analyses from high-income countries, which indicate a 25 percent prevalence of co-morbid depression (4). However, the greatest representation of studies around this relationship comes from middle-income countries, such as India and Mexico, which concurrently report the highest diabetes burden. There are most likely important differences in depression co-morbidity within populations and between LMICs. Further, because the majority of studies were conducted in urban areas, there may be important differences in comorbid depression among people with diabetes in rural areas. This is an important area that requires further research.

A limitation of this review is that it is difficult to make conclusive remarks about the association between depression and diabetes because of the heterogeneity of depression inventories used across the studies; this limitation is especially relevant because all studies were cross-sectional. Some studies demonstrated the variability of depression inventories by documenting discrepancies between depression inventories within the same population. Future studies would benefit from using more extensive depression inventories like the BDI-II that capture a wider range of depression symptoms compared to the briefer PHQ inventories. However, the PHQ is used broadly because it has been translated and validated in a variety of languages, which makes it an attractive comparative tool. Further, these discrepancies may result from variation of study type, such as rural-urban differences, if the

study was conducted in a clinic or was population-based, age of the sample, and if more women or men were surveyed.

Recommendations

With the energized commitment associated with the movement for global mental health, this is the ideal time to recognize the importance of depression in diabetes disability, morbidity, and mortality and to identify how to elevate mental health services within diabetes care. This review demonstrates that one in three people with diabetes in LMICs have co-morbid depression, and warns that depression among people with diabetes may increase as diabetes shifts from affluent to lower income groups. High-income country data indicates that treating depression among people with diabetes is cost effective (7,8), but more research is needed around what might be the cost of oversight of mental health problems among people with chronic illness in LMICs. Thus, these data should be interpreted as evidence for the need for mental health screening for people with diabetes.

Can new health systems, such as those in India and Mexico, afford to overlook the important role of depression in diabetes care? Evidence from these 48 studies underscores the need for comprehensive mental health care that is integrated into diabetes care within LMIC health systems. Incorporating mental health care into standard of care procedures for people with diabetes may be an effective way to elevate mental health care within an already established system of care. The International Diabetes Federation Guidelines on the Management of Type 2 diabetes devote a chapter to psychological care, which highlights that screening tools should be applied in routine diabetes care (33). Moreover, As advocated in the two Lancet series on global mental health, the WHO's mhGAP intervention guidelines (34), which illustrate how non-specialists can provide mental health care in routine health services, should become a tool applied to routine diabetes care. This horizontal approach could benefit from task-shifting some of diabetes care to health counselors who can manage the psychological and social aspects of diabetes for these patients. Indeed, such an approach may improve diabetes compliance to treatment regimens, as well, thereby improving mental health and diabetes outcomes.

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Figure 1.
Flow Chart of Literature Search

Table 1

Study Characteristics

Country	Human Development Index	Number of Studies Retrieved	% of Total	Millions with T2DM	Adult Prevalence of T2DM $\int$
India	0.547	8	17%	61.3	9.2%
Mexico	0.770	8	17%	10.3	15.9%
Brazil	0.718	5	10%	12.4	10.4%
China	0.687	5	10%	90.0	9.0%
Nigeria	0.459	4	8%	3.1	4.9%
Iran	0.707	4	8%	4.7	11.3%
Bangladesh	0.500	3	6%	8.4	10.7%
Pakistan	0.504	3	6%	6.3	8.0%
Russian Federation	0.755	2	4%	12.6	10.0%
Egypt	0.644	1	2%	7.3	16.9%
Iraq	0.573	1	2%	1.1	9.3%
Jordan	0.698	1	2%	0.29	12.4%
Oman	0.705	1	2%	0.14	10.8%
South Africa	0.619	1	2%	1.9	7.1%
Turkey	0.699	1	2%	3.5	8.1%
Total		48			

$\int$ The number in this column is the comparative prevalence presented in the 2011 Diabetes Atlas, which was calculated assuming that every country and region has the same age profile (the age profile of the world population has been used). This reduces the effect of age differences between countries and regions, and this figure is appropriate for making comparisons between countries.

Table 2

Comparative Perspective Studies of Depression among People with T2DM

Author (year)	Sample Source	Demographic	People with T2DM (n)	Women (%)	Mean Age (years)	Assessment of T2DM	Depression Prevalence	Depression Assessment
Sub-Saharan Africa								
Nigeria								
Akinlade et al 1996 (35) €	Clinic-based	Urban	46	n/a	n/a	Self-Report	15.2%	HAD
Mosaku et al 2008 (36) €	Clinic-based	Urban	80	54%	n/a	Self-Report	20%	ZSDS
Agbir et al 2010 (37)	Clinic-based	Urban	160	41%	53.5 +/- 11	FBG 7.0 mmol/L	19.4%	DSM-IV
James et al 2010 (38)	Clinic-based	Urban	200	54%	47.2 +/- 9.6	Medical Record	30%	SCAN
South Africa								
Kagee 2008 (39)	Clinic-based	Semi-Rural	119*	82%	52.0 +/- 13	Self-Report	45.9%	BDI-II
East and South Asia								
Bangladesh								
Asghar et al 2007 (40)	Population-based	Rural	184	57%	44.5 +/- 8.8	FBG 7.0 mmol/L	29.7%	MADRS
Rahman et al 2012 (41) €	Clinic-based	Urban	178	n/a	n/a	Self-Report	34.8%	CES-D
Roy et al 2012 (42)	Clinic-based	Urban	417	49%	53.2 +/- 7.6	Self-Report	34.0%	PHQ-9
China								
Xu et al 2004 (43)	Clinic-based	Urban	222	48%	56.4 +/- 12.7	Self-Report	23.0%	ZSDS
Zhang et al 2008 (44) (45)	Clinic-based	Urban	304	60%	59.4 +/- 14	Self-Report	25.7%	HADS
Yang and Zheng 2009 (46)	Clinic-based	Urban	148	62%	66.4 +/- 11	Self-Report	39.2%	ZSDS
Yu et al 2010 (47)	Clinic-based	Urban	100	40%	49.0 +/- 11	Self-Report	28.0% ¶	SDS
India								
Raval et al 2007 (48)	Clinic-based	Urban	300	51%	54.2 +/- 10	Medical Record	41.0%	PHQ-9
Solanki et al 2009 (49)	Clinic-based	Urban	50	n/a	<60 years	Medical Record	36.0%	BDI-II
Chaudhry et al 2010 (50)	Clinic-based	Urban	100	58%	58% > 50 years	Self-Report	84.0%	Hamilton
Poongothai et al 2010 (51)	Population-based	Urban	1,218	55%	45.8 +/- 13	FBG 7.0 mmol/L	19.7% ¶	PHQ-12
Poongothai et al 2011 (52)	Population-based	Urban	847	55%	50.0 +/- 10	FBG 7.0 mmol/L	23.4%	PHQ-12

Author (year)	Sample Source	Demographic	People with T2DM (n)	Women (%)	Mean Age (years)	Assessment of T2DM	Depression Prevalence	Depression Assessment
Balharra and Sagar 2011 (53)	Clinic-based	Urban	77	51%	54.7+/- 11	Self-Report	16.9%	PHQ-brief
Weaver and Hadley 2011 (54)	Clinic-based	Urban	33	100%	55 (39-79 yrs)	Self-Report	24.2%	HSLC-25
Guruprasad et al 2012 (55)	Clinic-based	Urban	210	66%	55+/- 50 yrs	Self-Report	25.0%	BDI-II
Pakistan								
Zahid et al 2008 (56)	Population-based	Rural	75	75%	54.0+/- 2.7	FBG 7.0 mmol/L	14.7%	MADRS
Khuwaja et al 2010 (57)	Clinic-based	Urban	889	58%	56.5+/- 50 yrs	Medical Record	43.5%	HADS
Perveen et al 2010 (58)	Population-based	Urban	296	27%	25-60 yrs	FBG 7.0 mmol/L	59.5% [¶]	Siddiqui
Europe and Central Asia								
Russian Federation								
Chazova et al 2007 (59) €	Clinic-based	Urban	140	n/a	n/a	Medical Record	48.6%	BDI-II
Sapozhnikova et al 2010 (60) €	Clinic-based	Urban	200	n/a	n/a	Medical Record	43.5%	CES-D
Turkey								
Sevincok et al 2001 (61)	Clinic-based	Urban	98	54%	55.2+/- 9.5	Self-Report	41.8%	BDI-II
Latin America								
Brazil								
Moreira et al 2009 (62)	Clinic-based	Urban	65	82%	53.0+/- 7.3	Self-Report	21.5%	BDI-II
Papelbaum et al 2011 (63) (64)	Clinic-based	Urban	70	77%	30-65 yrs	Self-Report	18.6%	BDI-II
Blay et al 2011 (65)	Population-based	Statewide	790	71%	100% >60 years	Self-Report	31.9%	Short SPES
De Ornelas Maia et al 2012 (66)	Clinic-based	Urban	100	67%	60.4+/- 11	Self-Report	2.0%	MINI
Mexico								
Garduno-Espinosa et al 1998 (67)	Clinic-based	Urban	79	73%	59.0+/- 11	Self-Report	46.0%	BDI-II
Tellez-Zenteno and Cardiel 2002 (68)	Clinic-based	Urban	189	58%	61.7+/- 13	Medical Record	34.0%	BDI-II
Lerman et al 2004 (69)	Clinic-based	Urban	176	63%	55.0 +/- 11	Self-Report	50.0%	Targeted Question

Author (year)	Sample Source	Demographic	People with T2DM (n)	Women (%)	Mean Age (years)	Assessment of T2DM	Depression Prevalence	Depression Assessment
Garcia et al 2006 (70)	Clinic-based	Urban	796	61%	60.5+/- 11	HbA1c 7%	41.2%	ZSDS
Colunga-Rodriguez et al 2008 (71)	Clinic-based	Urban	450	62%	60.0+/- 10	Self-Report	63.0%	ZSDS
Mier et al 2008 (72)	Population-based	Rural	200	77%	55.8+/- 12	Self-Report	40.5%	CES-D
Castro-Ake et al 2009 (73)	Clinic-based	Urban	186	71%	30-60 yrs	FBG 7.0 mmol/L **	27.4%	MINI
Tovilla-Zarate, et al 2012 (74)	Clinic-based	Urban	820	56%	58.3% > 50 yrs	Self-Report	48.3%	Hamilton
Middle East								
Egypt								
Shehatah et al 2010 (75)	Clinic-based	Urban	458	53%	65.0 +/- 8.9	FBG 7.0 mmol/L	32.1%	BDI-II
Iran								
Khamseh et al 2007 (76)	Clinic-based	Urban	140	64%	47.2+/- 16	Self-Report	70.0%	BDI-II
Nikbakht et al 2009 (77)	Clinic-based	Urban	100	79%	48	Self-Report	50.0%	BDI-II
Yekta et al 2010 (78) €	Clinic-based	Urban	295	n/a	n/a	Self-Report	43.4%	BDI-II
Khamseh et al 2011 (79)	Clinic-based	Urban	185	52%	56.2+/- 9.6	Self-Report	47.6%, 61.6%	PHQ-9, CES-D
Iraq								
Saeed et al 2003 (80)	Clinic-based	Urban	110	55%	35-65 yrs	Self-Report	40.0%	DSM-IV
Jordan								
Al-Amer et al 2007 (81)	Clinic-based	Urban	581	57%	91% > 40 years	HbA1c 7%	20.1%	PHQ-8
Oman								
Al-Maskari et al 2010 (82)	Clinic-based	Urban	30	27%	47.0+/- 8.6	Self-Report	20.0%	HADS

* This singular study of depression and diabetes in South Africa includes people with diabetes and hypertension. In this sample, 68.5% had hypertension, 20.2% had diabetes, and 11.3% were diagnosed with both conditions.

** Not confirmed because cannot access full article.

¶ Newly diagnosed diabetes (less than three months)

€ Abstract-review due to failure to access article

Table 3

Depression Inventories Consulted Across Studies

Depression Inventory	Number of studies (n, %)
Beck Depression Inventory; BDI-II	13 (28%)
Patient Health Questionnaire; PHQ-brief, PHQ-8, PHQ-9, PHQ-12	7 (15%)
Zung self-rating depression scale; ZSDS	5 (11%)
Center for Epidemiologic Studies Depression Scale; CES-D	4 (9%)
Hospital Anxiety and Depression Scale; HADS	3 (7%)
MINI International Neuropsychiatric Interview; MINI	2 (4%)
Hamilton Depression Rating Scale	2 (4%)
Montgomery-Asberg Depression Scale; MADRS	2 (4%)
Structured Clinical Interview for DSM-IV (DSM-IV)	2 (4%)
Schedule for the Clinical Assessment in Neuropsychiatry; SCAN	1 (2%)
Self-Rating Depression Scale; SDS	1 (2%)
Short Psychiatric Evaluation Schedule (Short-SPES)	1 (2%)
Siddiqui Shah Depression Scale	1 (2%)
Hopkins Symptoms Check-List; HSCL-25	1 (2%)
"During the past month, have you felt down, depressed or hopeless?"	1 (2%)