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Research report

# Validity of the patient health questionnaire-9 to screen for depression in a high-HIV burden primary healthcare clinic in Johannesburg, South Africa

R. Cholera [a,*], B.N. Gaynes [b], B.W. Pence [a], J. Bassett [c], N. Qangule [c], C. Macphail [d], S. Bernhardt [c], A. Pettifor [a], W.C. Miller [a,e]

[a] Department of Epidemiology, UNC Gillings School of Global Public Health, McGavran-Greenberg Hall, 135 Dauer Drive, Chapel Hill, NC 27599, USA
[b] Department of Psychiatry, UNC School of Medicine, USA
[c] Witkoppen Health and Welfare Center, Johannesburg, South Africa
[d] Collaborative Research Network for Mental Health and Well-being in Rural Communities, University of New England, Armidale, Australia & Wits Reproductive Health and HIV Institute, University of the Witwatersrand, Johannesburg, South Africa
[e] Department of Medicine, UNC School of Medicine, USA

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ABSTRACT

*Background:* Integration of depression screening into primary care may increase access to mental health services in sub-Saharan Africa, but this approach requires validated screening instruments. We sought to validate the Patient Health Questionnaire-9 (PHQ-9) as a depression screening tool at a high HIV-burden primary care clinic in Johannesburg, South Africa.
*Methods:* We conducted a validation study of an interviewer-administered PHQ-9 among 397 patients. Sensitivity and specificity of the PHQ-9 were calculated with the Mini International Neuropsychiatric Interview (MINI) as the reference standard; receiver operating characteristic (ROC) curve analyses were performed.
*Results:* The prevalence of depression was 11.8%. One-third of participants tested positive for HIV. HIV-infected patients were more likely to be depressed (15%) than uninfected patients (9%; $p=0.08$). Using the standard cutoff score of $\geq 10$, the PHQ-9 had a sensitivity of 78.7% (95% CI: 64.3–89.3) and specificity of 83.4% (95% CI: 79.1–87.2). The area under the ROC curve was 0.88 (95% CI: 0.83–0.92). Test performance did not vary by HIV status or language. In sensitivity analyses, reference test bias associated with the MINI appeared unlikely.
*Limitations:* We were unable to conduct qualitative work to adapt the PHQ-9 to this cultural context.
*Conclusion:* This is the first validation study of the PHQ-9 in a primary care clinic in sub-Saharan Africa. It highlights the potential for using primary care as an access point for identifying depressive symptoms during routine HIV testing. The PHQ-9 showed reasonable accuracy in classifying cases of depression, was easily implemented by lay health workers, and is a useful screening tool in this setting.


## 1. Introduction

Mental illness imposes an immense global disease burden, particularly in low and middle-income countries where access to mental health services is lacking (Kessler et al., 2009; Becker and Kleinman, 2013). Major depressive disorder (MDD) is the second leading contributor to years lived with disability (YLD) globally, and ranks within the top four causes of YLDs in all regions worldwide (Vos et al., 2012). In sub-Saharan Africa more than two-thirds of patients with severe mental illness are unable to access mental health care and this number rises to approximately 80% for patients with moderate or mild mental illness (Wang et al., 2007). To address these challenges, the integration of mental health screening approaches in primary care has been suggested as a mode for increasing access to care in low and middle-income settings (Collins et al., 2013; Tomlinson et al., 2009b).

The implementation of routine mental health screening in sub-Saharan African primary health care (PHC) settings requires validated rapid screening instruments that can be easily administered by lay healthcare workers in busy clinics (Freeman et al., 2005; Becker and Kleinman, 2013). To our knowledge, brief depression screening tools have not been validated for a general PHC context in sub-Saharan Africa. A limited number of validation studies of depression screening tools have been conducted against

* Corresponding author.
*E-mail address:* rcholera@med.unc.edu (R. Cholera).

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diagnostic reference standards in sub-Saharan African settings, but these studies have varied in their choice of context, screening tool, and diagnostic measure (Andersen et al., 2011; Akena et al., 2012a, 2012b, 2013; Pence et al., 2012; Chishinga et al., 2011; Monahan et al., 2009; Myer et al., 2008; Nakimuli-Mpungu et al., 2012b; Spies et al., 2009; Adewuya et al., 2006). In particular, the populations included in these studies, such as university students, household survey participants, pregnant or postnatal women, or HIV-infected patients, are not easily generalizable to a PHC population.

Depression is a common and debilitating comorbidity of HIV in sub-Saharan Africa. The reported prevalence of depression in HIV-infected African adults in ranges from 8% to 60%, several times greater than prevalence estimates in the general population (Ramirez-Avila et al., 2012; Hughes et al., 2004; Kagee and Martin, 2010; Myer et al., 2008; Olley et al., 2004; Lawler et al., 2011; Kinyanda et al., 2011; Nakimuli-Mpungu et al., 2011, 2012a; Tomlinson et al., 2009a). The relationship between MDD and HIV is complex, as depression can be a risk factor for HIV acquisition as well as a consequence of HIV infection (Smit et al., 2006; Simoni et al., 2011). However, MDD has long been recognized as a predictor of negative clinical outcomes among people with HIV (Bing et al., 2001; Simoni et al., 2011; Owe-Larsson et al., 2009, Lopes et al., 2012). Persons with depression initiate anti-retroviral treatment (ART) at lower CD4 counts than people without mental illness, and depressed patients are much less likely to adhere to ART than patients who are not depressed (Tegger et al., 2008; Gonzalez et al., 2011; Nakimuli-Mpungu et al., 2012a; Kaharuza et al., 2006).

Routine mental health screening in PHC settings, where most HIV-infected patients are diagnosed and seek regular care, might be a valuable approach to identify both HIV-infected and HIV-uninfected patients who require further mental health assessment. Routine depression screening is recommended for HIV infected patients in high-resource settings and can be an effective way to identify patients at risk for negative outcomes (Shacham et al., 2009; Schumacher et al., 2012; O'Connor et al., 2009). Depressed HIV-infected patients who receive treatment for mental health illness have improved ART adherence and increased quality of life (Yun et al., 2005; Elliott et al., 2002). As interventions to increase access to early ART are scaled up throughout sub-Saharan Africa and universal HIV counseling and testing (HCT) becomes the norm, integration of mental health services and HIV programs could be an important component of ensuring optimal care and treatment utilization for these two highly comorbid conditions (Stein et al., 2005).

Here, we have conducted a validation study of an interviewer-administered brief screening tool for depression, in a high HIV burden, low literacy PHC population in Johannesburg, South Africa. We sought to validate the PHQ-9 as a depression screening tool compared to the internationally validated Mini International Neuropsychiatric Interview (MINI) among patients undergoing routine HCT in a primary care setting. We also sought to provide additional evidence of the utility of the PHQ-9 among HIV-infected people in sub-Saharan Africa.

## 2. Methods

### 2.1. Ethical approvals

The Institutional Review Board at the University of North Carolina (No. 12-1730) and the Human Research Ethics Committee at the University of Witwatersrand (No. M120725) approved this study.

### 2.2. Study setting and population

Witkoppen Health and Welfare Centre (WHWC) is a high-volume primary health care clinic in northern Johannesburg, South Africa that provides comprehensive services predominantly to persons living in densely populated peri-urban formal and informal settlements. At WHWC, every clinic client with an unknown HIV status or with a negative HIV test more than three months old routinely undergoes opt-out HCT.

The study population comprised a randomly selected subset of patients who were undergoing routine HCT at WHWC between September 2012 and April 2013. Participants were eligible for enrollment if they presented at WHWC for any reason, were at least 18 years old, not pregnant by self-report, could communicate in one of 5 common languages used by interviewers (English, isiZulu, isiXhosa, seSotho, seTswana), and were able to provide informed consent. Persons found to be experiencing acute suicidal ideation during the PHQ-9 were excluded and referred for immediate assistance.

### 2.3. Measures

*PHQ-9*

The PHQ-9 is a 9-item depression screening tool that determines the presence and frequency of the 9 core depressive symptoms identified in the DSM-IV over the previous 2 weeks. This tool has been widely utilized in Western settings and more recently in sub-Saharan Africa (Pence et al., 2012; Monahan et al., 2009; Adewuya et al., 2006; Akena et al., 2013). Scores range from 0 to 27, with a score of 10 or higher typically used to indicate the presence of a depressive disorder that would benefit from treatment. While the PHQ-9 was developed to be self-administered, interviewer-administration has yielded similar results (Pinto-Meza et al., 2005).

*MINI*

The MINI International Neuropsychiatric Interview (MINI) is a short, structured diagnostic interview for major psychiatric disorders. The MINI served as the reference standard in this study (Sheehan et al., 1998). The MINI is a reliable and valid diagnostic tool that has been used successfully in South African populations (Myer et al., 2008; Olley et al., 2004). We used the MINI modules for major depressive disorder (MDD), anxiety disorders (generalized anxiety disorder, panic disorder, social anxiety disorder, post-traumatic stress disorder), suicidality, and bipolar disorder.

### 2.4. Study procedures

Eligible patients were selected randomly for recruitment each day. Patients were recruited after clinic registration but prior to undergoing HCT. After providing informed consent, the patient completed the screening interview, including the PHQ-9, with a trained lay-interviewer. Questions about substance abuse and knowledge of HIV status (from prior testing experiences) were also included in the questionnaire. Socio-demographic information and clinical information were obtained from the patient's WHWC clinic file. Due to low literacy in the study population, the questionnaire was administered by the interviewer and responses were recorded on a paper form. The questionnaire was translated and conducted in 5 common languages (English, isiZulu, isiXhosa, seSotho, seTswana).

After the screening interview, participants immediately completed the MINI interview with a second study team member who was blinded to the results of the PHQ-9. The MINI interview was conducted by health care professionals trained in use of the