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The Validity of The Patient Health Questionnaire-2 As A Depression Screening Tool in Women Receiving Antenatal Care at Chelstone First Level Hospital, Lusaka, Zambia

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Abstract

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Background: The Patient Health Questionnaire-2 is frequently used as the first step in assessing people for major depressive disorder symptoms. However, its accuracy in correctly distinguishing between major depressive disorder cases and non-cases among pregnant women seeking prenatal care services in Zambia has not been studied. We set out to determine the validity of The Patient Health Questionnaire-2 as a brief screening tool for antenatal depression in pregnant women attending antenatal care services at Chelstone First Level Hospital in Lusaka, using the Edinburgh Postnatal Depression Scale as the gold standard.
Method: We carried out a descriptive cross-sectional study and enrolled pregnant women who were receiving prenatal treatment at Chelstone First Level Hospital. The Patient Health Questionnaire -2 was used to screen 281 pregnant women, with the Edinburgh Postnatal Depression Scale (EPDS) serving as the gold standard. The Patient Health Questionnaire -2's concurrent validity was determined by comparing its performance in distinguishing between major depressive disorder cases and non-cases with the Edinburgh Postnatal Depression Scale, which served as the gold standard.
Results: On receiver operating characteristic curve analysis, the Patient Health Questionnaire-2 predicted major depressive disorders with 66 percent sensitivity and 89 percent specificity at a cut-off score of 2, with an area under the curve (AUC) of 0.90 [95 percent CI: 0.85-0.94]. For identifying major depressive illness in pregnancy, a cut-off value of 2 was shown to be best for optimizing sensitivity without sacrificing specificity. Women with a PHQ-2 score of 2 had substantially higher Edinburgh Postnatal Depression Scale ratings for depressive symptoms than women with a score less than 2. The PHQ-2 had a positive and negative predictive value of 0.75 and 0.83, respectively.
Conclusion: The PHQ-2 is a reliable screening tool for major depression in pregnant women seeking prenatal healthcare in primary care. To confirm the diagnosis, it should be followed by a more comprehensive diagnostic process involving structured clinical interviews or longer diagnostic tools such as the Structured Clinical Interview for DSM Disorders.

Keywords: *Major Depressive Disorder, Psychometrics, Receiver Operating Characteristic Curve Analysis, Sensitivity, Specificity, Area under the Curve, Antenatal Care, Patient Health Questionnaire-2*

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INTRODUCTION

Depression is a psychiatric condition marked by a loss of interest and pleasure in pleasurable activities, a depressed mood, and a variety of emotional, cognitive, physical, and behavioural symptoms [1]. Around 10% of pregnant women worldwide suffer from a mental illness, the most common of which is depression- This is significantly greater in low-middle-income nations, where it stands at 15.6 percent during pregnancy [2]. According to the World Health Organisation, major depressive disorder (MDD) was expected to become the primary cause of disability and the second biggest contributor to the global burden of disease by 2020[3].

The American College of Obstetricians and Gynaecologists (ACOG) recommends that obstetricians–gynaecologists and other obstetric care providers assess patients for depression and anxiety symptoms using a standardized and validated test at least once throughout the perinatal period [4]. It is further suggested that screening can have clinical benefits on its own, but that treatment or referral to mental health care providers is of most benefit, therefore, clinical staff in obstetrics and gynaecology practices should be prepared to start medical treatment, send patients to appropriate behavioural health facilities, or do both as necessary.

With the foregoing guidelines, systematic depression screening among pregnant women seeking prenatal care in low-resource settings has yet to be implemented [5,6]. This is attributable to a shortage of mental health specialists, mental health stigma, a lack of locally validated tools, and a specific policy to screen for mental disorders such as depression in primary care settings. Moreover, there is a common reluctance among prenatal care providers to employ measures such as the Edinburgh Postnatal Depression Scale (EPDS) since it is too long for their busy obstetric clinical context and is better suited for mental health care professionals. Brief screening instruments, such as the Patient Health Questionnaire-2 (PHQ-2), play an important role in these care models by serving as clinical tools for case detection, symptom monitoring, and referral to a higher level of care when necessary. The bulk of brief screening measures, on the other hand, were created and validated in Western countries [7]. As a result, such screening tools may have variations of application due to social and cultural contexts. In addition, the intensity, manifestation, and presentation of symptoms differ, implying the necessity for psychological tools to be tailored to the particular context. To our knowledge, no study has examined the Patient Health Questionnaire-2's applicability as a quick depression screening tool among Zambian pregnant women in primary health care. The goal of this study was to compare the validity of the Patient Health Questionnaire-2, a two-item depression screener, to the gold standard, the Edinburgh Postnatal Depression Scale, among pregnant women accessing prenatal care services at Chelstone First Level Hospital in Lusaka, Zambia.

METHODS AND MATERIALS

Study Design

The concurrent validity of the Patient Health Questionnaire-2 was assessed using a descriptive cross-sectional study with the Edinburgh Postnatal Depression scale as the gold standard.

Study setting

The research was carried out at the Chelstone First Level Hospital's prenatal clinic in Lusaka, Zambia. Chelstone First Level Hospital is a general medical center. At the time of the study, the prenatal clinic at Chelstone First Level Hospital was providing primary health care by providing prenatal care without screening for depression or other common mental disorders. Chelstone First Level Hospital was chosen through a simple random sampling of all first-level hospitals in the Lusaka District that provide primary health care.

Sample

Between October and December 2019, 281 pregnant women who attended the prenatal clinic at Chelstone First Level Hospital were recruited during a twelve-week period. The participants were chosen using a systematic sampling approach. A total of 600 expecting women visited the prenatal clinic each month, resulting in a two-month sample period (2). A test was performed on every second prenatal mother. All consenting or assenting women with a confirmed positive pregnancy test were included in the study, but those with acute medical or surgical issues or acute/severe psychological illnesses were excluded.

Procedures

A psychiatry resident and a Master's of Science in Clinical Neuropsychology student trained the research assistants (Registered Nurse, and Clinical Officer Psychiatry) for two days on depression and the use of the Patient

Health Questionnaire-2 and Edinburgh Postnatal Depression Scale (EPDS). After that, study assistants gave five pregnant women at Mtendere Antenatal Clinic the Sociodemographic and Clinical Characteristics questionnaire, the Patient Health Questionnaire-2 (PHQ-2) and the Edinburgh Postnatal Depression Scale (EPDS).

The women were approached and recruited into the study prior to their regular antenatal follow-up at Chelstone First Level Hospital, after providing informed consent or assent. The participants then completed the Socio-demographic and clinical information questionnaire with a Clinical Officer General. After that, the participant worked with a Registered Nurse to complete the PHQ-2. After the screening interview with the PHQ-2, the respondents completed the EPDS with a Clinical Officer Psychiatry who was blinded to the results of the PHQ-2. The interviewer employed Chichewa and English to accommodate all eligible participants, even those with limited education. Participants who tested positive for depression on a screening test were sent to Chainama Hills College Hospital or University Teaching Hospital Clinic 6 for further evaluation and treatment. Figure 1 depicts a flowchart for the study subjects' enrollment and follow-up.

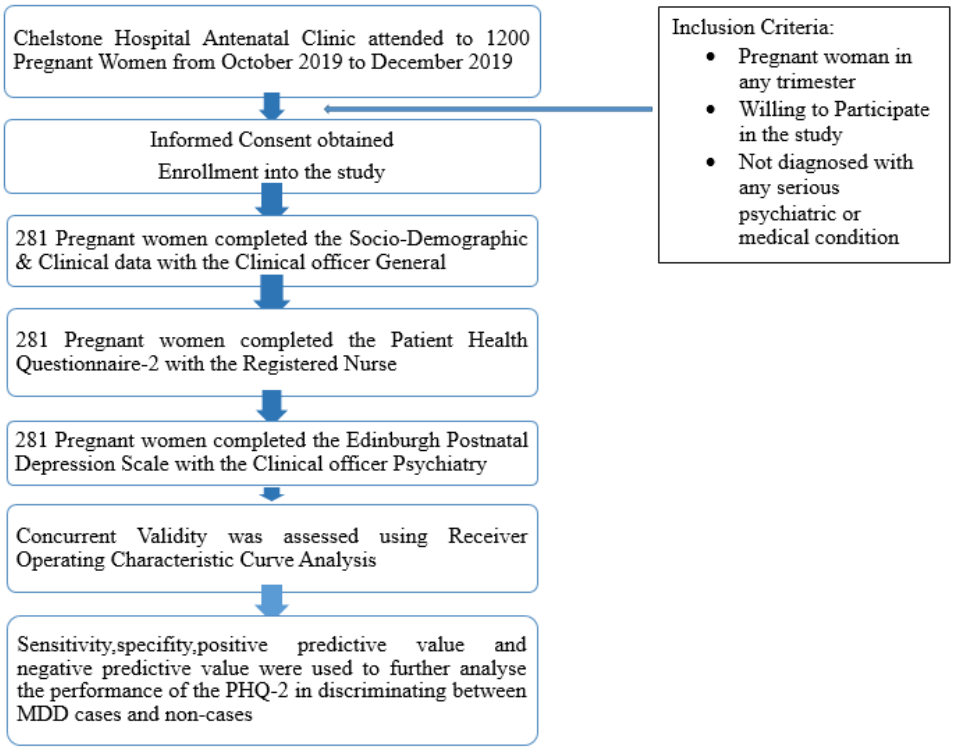

Figure 1. A flowchart depicting the study's enrolment and follow-up procedures

Data Collection

Patient Health Questionnaire-2 (PHQ-2)

The PHQ-2 has strong diagnostic validity, with sensitivity and specificity that are equivalent to longer depression tests [8]. The PHQ-2 is made up of the first two items from the longer Patient Health Questionnaire-9, which has nine items that correspond to the DSM-V major depression criteria. These nine items make up the first section of the Patient Health Questionnaire, which was created as a self-report scale to screen for common psychiatric illnesses in basic care. The two-question screen examines both sad mood and anhedonia, and a positive response to either item provides a positive result when employed in a binary yes/no form. The Likert-type scoring system was utilized in this study, using a scale of 0, 1, 2 and 3, with 0 indicating "not at all", 1 indicating “several days”, 2 indicating “more than half the days” and 3 indicating "Nearly

every day." In busy settings like the prenatal clinic, the two-item scale decreases the time spent screening patients, boosting the number of people evaluated for depression, a curable mental condition. The Patient Health Questionnaire-2 was chosen for this investigation because of its sensitivity and specificity, which are comparable to that of longer screening tools, as well as its brevity.

The Edinburgh Postnatal Depression Scale (EPDS)

The EPDS is a 10-item antepartum and postpartum depression screening test. To determine whether or not someone has depression, the scores for the ten (10) items are totaled up, yielding a minimum score of 0 and a maximum score of 30. Typically, a cut-off of 11/12/13 is utilized, with people who score below it being considered as not having depression. A higher score indicates that the person is experiencing more depression symptoms. This screening questionnaire has items that correspond to depressed symptoms such anhedonia, sleep difficulties, lethargy, and guilt. EPDS' psychometric qualities, including as specificity and sensitivity, have been extensively examined across cultures and countries. England, Australia, Sweden, Chile, Canada, Portugal, Italy, France, China, South Africa, Malawi, Brazil, Spain, Turkey, and Germany have all tried the scale [9]. Furthermore, the instrument's positive and negative predictive values have been reported to be 74 percent and 94 percent, respectively, making it a trustworthy and valid depression screening tool [10]. The EPDS was a good reference/gold standard for this investigation because of these characteristics.

Data Analysis

The data was analyzed using the Statistical Package for Social Sciences version 20. With the EPDS as the gold standard, the capacity of the PHQ-2 to discriminate between MDD cases and non-cases was investigated using the receiver operating characteristic (ROC) curve analysis. The area under the curve (AUC) measures the PHQ-2's ability to distinguish between people who have MDD and those who don't. Scores above 0.9 indicate "high" accuracy, while scores between 0.7 and 0.9 suggest "moderate" accuracy, scores between 0.5 and 0.7 suggest "poor accuracy," and 0.5 indicates a chance outcome [11]. The PHQ-2's sensitivity, specificity, positive predictive value, and negative predictive value were determined to further examine the tool's efficacy in distinguishing between cases and non-cases.

RESULTS

Receiver operating characteristic analysis for major depressive disorder in pregnancy

The PHQ-2's performance in correctly detecting MDD cases and non-cases is seen in Figure 2's receiver operating characteristic (ROC) curve. The PHQ-2 has an area under the curve (AUC) of 90% (AUC = 0.90), indicating that it is quite accurate in detecting MDD cases.

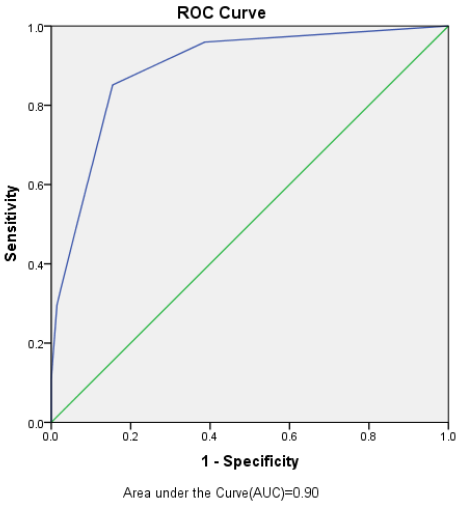

Figure 2: Area under the Curve

The appropriate cut-off value of 2 is shown in Table 1, which produced the best combination of sensitivity (0.66) and specificity (0.66). (0.89).

TABLE 1: ROC curve coordinates of the Patient Health Questionnaire-2 using the Edinburgh Postnatal Depression Scale as the gold standard among pregnant women

Positive if Greater Than or Equal To[a]	Sensitivity	1– Specificity	Specificity
0.50	0.96	0.39	0.61
1.00	0.91	0.27	0.73
1.50	0.85	0.16	0.84
***2.00**	**0.66**	**0.11**	**0.89**
2.50	0.47	0.06	0.94
3.00	0.39	0.04	0.96
3.50	0.30	0.01	0.99
4.50	0.11	0.00	1.00
5.50	0.05	0.00	1.00
6.00	0.03	0.00	1.00

Note: The row in bold indicates the optimal cut-off point which yielded optimal sensitivity and specificity. The positive predictive value (PPV) was 75.0 percent, and the negative predictive value (NPV) was 83.3 percent, as shown in Table 2. Individuals who scored 2 and above were 75.0 percent likely to fulfill the diagnostic criteria for MDD, whereas those who scored less than 2 were 83.0 percent likely to not fulfill the criteria for the illness.

Table 2: Receiver Operating Characteristic (ROC) curve analysis

	PHQ-2 Cut-Off Point	AUC (95%CI)	Sensitivity	Specificity	PPV	NPV
PHQ-2	≥ 2	0.90 (95% CI [0.85-0.94]	0.66	0.89	0.75	0.83

DISCUSSION

This is the first study that we are aware of that validates the Patient Health Questionnaire-2 (PHQ-2) among Zambian women receiving prenatal treatment in primary health care. The PHQ-2 performed well in discriminating between MDD cases and non-cases (AUC=0.90), making it an accurate measure of depression among women seeking ante-natal care in primary healthcare, according to the present study. This outcome is in line with a validation research conducted in Japan among 598 outpatients of a rural hospital's internal medicine clinic, which found that the PHQ-2 had a high accuracy (AUC=0.95) in distinguishing between cases and noncases [1].The current study's finding of the PHQ-2's high accuracy in distinguishing cases from noncases is also consistent with a study conducted in Mexico among 223 adults in a rural community, which found an area under the receiver operating characteristic curve of 0.89 and concluded that the PHQ-2 is a useful tool for screening and diagnosing depression in rural settings [13].

The PHQ-2 cut-off point of 2 resulted in appropriate sensitivity (66%) and specificity (89%) values, indicating that this cut-off point may be the best for distinguishing between MDD cases and noncases among pregnant women seeking antenatal treatment. Earlier studies have reported variations in the sensitivity and specificity of the PHQ-2 at the cut-off score of two. For instance, a study conducted at a tertiary psychiatry hospital among 74 outpatients and inpatients reported a sensitivity of 91.9 percent and a specificity of 100 percent [14] while another study conducted among 110 Parkinson's disease patients reported that a sensitivity of 75 percent and a specificity of 89 percent at this cut-off score [15]. This variation is clearly explained by the variation in cultural setting, which demonstrates the need to validate psychological tools for a particular setting before use and that depression may not be experienced in the same way by women from different cultural settings.

However, it's worth noting that the original PHQ-2's recommended cut-off score is three [16]. The initial PHQ-2 validation research, which included 580 primary care patients, found a sensitivity of 83 percent and a specificity of 90 percent at a cut-off score of three [8]. A validation study of 499 teenagers reported a sensitivity of 74% and a specificity of 75% at a cut-off score of three [17]. Across the current study's sample, using the test with this cut-off score reduced sensitivity by 27%, underlining the importance of validating psychologic evaluation instruments in a variety of social and cultural settings.

A study in the United States among 8,205

adults aged 65 and older who took part in the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) found that at a cut-off point of one, the sensitivity was 100 percent and the specificity was 77 percent[18]. In comparison, the current investigation discovered a lower sensitivity for PHQ-2 at a cut-off value of 2. According to the current analysis, the PHQ-2 had a greater specificity than sensitivity. As a result of these differences, determining the appropriate PHQ-2 cut-off point is a trade-off between sensitivity and specificity, as it is with any measure.

Although the current study's analysis reveals that a cut-off points of 2 is a good compromise, a cut-off points of 1 would improve sensitivity, while a cut-off points of 3 would improve specificity. Overemphasizing sensitivity for depression screening in primary care should be avoided, partly due to the high volume of patients seen in primary care and partly because a highly sensitive cut-off point combined with a low prevalence of major depressive disorder means that the majority of patients who test positive are false-positive cases. A test with a high specificity, on the other hand, would result in a large number of false negatives due to the test's low sensitivity[19]. In contexts where the prevalence of depression is substantially higher (for example, psychiatric settings or hospitalized patients), a high-sensitivity cut-off point should be explored to capture as many individuals with depressive symptoms as possible.

Using a cut-off point of 2, the PHQ-2 had an adequate PPV (75.0 percent) in detecting those with depressive symptoms, implying that persons with a positive screening test have a 75.0 percent chance of being diagnosed with MDD. In a validation study conducted in Zimbabwe, this outcome was comparable to the positive predictive value (PPV) of the Edinburgh Postnatal Depression Scale (EPDS), a lengthier depression screening measure. The prevalence estimates of the underlying ailment or disorder, in this case MDD, determines the PPV. Because the sample had a moderate prevalence of MDD symptoms, the PPV was likewise modest. The NPV, on the other hand, was 83.0 percent, implying that those with a negative test had an 83.0 percent chance of being diagnosed with MDD. This results is comparable to that of a study conducted among adolescents in Seattle, which found a substantial negative predictive value [17]. In view of the foregoing, PHQ-2 is quite good at predicting non-cases but not so good at predicting MDD cases. The PHQ-2, on the other hand, is an excellent first step in a multistage screening strategy, particularly in busy clinical settings like the antenatal clinic, when time is of the essence. Individuals who test positive for MDD may benefit from referral to a Mental Health Clinic for a more thorough evaluation, as a positive PHQ-2 screen is insufficient to diagnose a psychiatric disease. According to the findings of this study, the Ministry of Health of the Republic of Zambia should consider integrating the two PHQ-2 screening items in normal antenatal care to encourage early identification and treatment of prenatal depression in primary health care.

LIMITATIONS

The fact that we only recruited individuals from one site that provided antenatal care services is a drawback of our study, which restricts its generalizability. This limitation was overcome by using simple random sampling to select the research site, which allowed the findings to be generalized to other populations in low-middle income countries with comparable sociodemographic characteristics. Another drawback is that the current study design does not contain a control group, making it impossible to compare the PHQ-2 performance of our sample to that of a comparative group of nonpregnant women using other services at the same institution. It's worth noting, however, that the big sample size was sufficient to answer the goal of the study, which was to report on the validity of the PHQ-2 in correctly distinguishing between cases and non-cases of major depressive illness.

CONCLUSION

The Patient Health Questionnaire-2 has excellent psychometric properties, making it a reliable and practical tool for depression screening in busy clinical settings like the prenatal clinic, especially where simplicity is a necessity. However, because of the low positive predictive value, it would be more appropriate to identify people who would benefit from a follow-up assessment in a multistage depression assessment model, where they would complete a more comprehensive psychological tool or diagnostic interview to see if they meet the MDD diagnostic criteria.

DECLARATION

Competing interests There were no competing interests from all authors in this study.

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Data availability statement The data supporting the findings of this study are available upon request from the corresponding author, BM.

Ethics approval Several ethical issues drove the research. Prior to performing the study and disseminating the results, we secured ethical clearance from ERES converge IRB (Reference Number 2019-Feb-001). The autonomy of the participants was respected. They were made aware of the study's voluntary nature and their right to withdraw at any time without penalty. They were also informed that the interview might elicit some strong emotions in them and that they could leave at any time if they felt uncomfortable. The advantages of the study, such as not having to talk about the problem and being referred for help if needed, were also explained to the participants. The National Health Research Authority (NHRA), the Lusaka District Medical Office, and Chelstone First Level Hospital Management in Zambia all gave their approval. Consent form and assent forms were made available on the spot in English and Chichewa through an interpreter, and their signatures or thumbprints were added after they read, or the form was read to them. During and after the interview, confidentiality was maintained, and each participant was given a number and guaranteed that their names would not be published in the report. Furthermore, the data was kept on a password protected computer during the analysis stage.

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