

Depression, Anxiety, And Stress Among Women with Recurrent Miscarriage: The Role of Socio-Demographic and Economic Factors

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ABSTRACT

Recurrent miscarriage, defined as two or more pregnancy losses before 24 weeks of gestation, can have a considerable psychological impact, but less is known about the sociodemographic characteristics associated with psychological distress among affected women in Nigeria. This cross-sectional survey examined levels of depression, anxiety and stress, and their association with sociodemographic and socioeconomic characteristics, among 200 women with recurrent miscarriage recruited via purposive sampling from five healthcare facilities and online maternal health platforms in Lagos State, Nigeria. Depression, anxiety and stress were measured using the Depression Anxiety Stress Scales–21 (DASS-21). Associations with age, marital status, highest level of education, employment status and household income were examined using Pearson's chi-square test, with Fisher's exact test applied where more than 20% of cells had expected counts below 5, and effect sizes reported using Cramér's V. Distress was observed across all three dimensions, although anxiety showed the highest severity: 40.0% of participants scored in the extremely severe range, compared with 13.0% for depression and 7.0% for stress. Age was significantly associated with anxiety, marital status with depression, and highest level of education with both depression and stress (all $p < .05$); employment status and income showed no significant associations. Given the non-probability sampling approach, these findings should be interpreted as describing the study sample rather than the wider population. Targeted psychological support, particularly addressing anxiety among older, divorced and less educated women, may be warranted within Nigerian reproductive healthcare settings.

Keywords: recurrent miscarriage, depression, anxiety, stress, sociodemographic factors.

INTRODUCTION

Childbearing is highly valued in many Nigerian families and communities. In many communities, motherhood also carries important social meaning and can shape how a woman is viewed within her family and community (Ibisomi & Mudege, 2014; Odunsi & Hosek, 2024). Because fertility is given considerable social importance, infertility and pregnancy loss can affect women beyond the immediate medical experience, including through stigma, questions about fertility and difficulties within family relationships (Nwankwor & Okafocha, 2026; Oigene et al., 2026).

Recurrent miscarriage is defined as two or more pregnancy losses before 24 weeks of gestation (American Society for Reproductive Medicine [ASRM], 2020; European Society of Human Reproduction and Embryology [ESHRE], 2023). It is estimated to affect 2 to 5% of women globally, although the true figure may be higher because early pregnancy losses are often under-reported or inconsistently recorded (Dimitriadis et al., 2020; Eleje et al., 2023). The risk of subsequent loss rises with each successive miscarriage, from approximately 16% after one loss to over 50% after four (ESHRE Working Group on RPL et al., 2023), and a large share of cases remain medically unexplained even after investigation (Dobson & Jayaprakasan, 2018).

Previous studies have consistently reported higher levels of depression, anxiety and stress among women who experience recurrent miscarriage. This has been documented across settings as diverse as the Middle East, East Asia and Eastern Europe (Farren et al., 2018; Qu et al., 2021; Al-Busaidi et al., 2026). A systematic review of 29 studies covering more than 35,000 women reported a pooled prevalence of approximately 30 to 34% for depression, anxiety and stress shortly after loss (Shetty et al., 2025). A review restricted specifically to recurrent, rather than single, pregnancy loss found consistently elevated distress alongside reduced sleep quality and wellbeing (Sánchez-Ortí et al., 2026). Within Nigeria, Eleje et al. (2023) found higher depression, anxiety and stress among women with recurrent miscarriage relative to women without such a history. Gbaranor et al. (2025), studying married women in South-South Nigeria, reported that 76% of participants reported depressive symptoms alongside frequent accounts of family-related harassment. These findings suggest that psychological distress may be influenced not only by the experience of miscarriage itself but also by the social environment in which women experience it. This may be particularly relevant in Nigeria, where expectations surrounding fertility and motherhood can be strong (Gbaranor et al., 2025; Igbokwe et al., 2026).

Beyond documenting elevated distress, a smaller body of research has examined which sociodemographic and socioeconomic characteristics are associated with greater or lesser severity. Some studies link younger age to higher distress (Burdecka & Szablewska, 2025; Mutiso et al., 2019), while others report elevated distress among older women facing narrowing reproductive prospects (Gao et al., 2020; Kicia et al., 2021). Higher educational attainment has generally been associated with lower depression and anxiety (Wang et al., 2023; Mutiso et al., 2019; Fernández-Basanta et al., 2023), which may partly reflect differences in health literacy and access to coping resources, although cross-sectional designs cannot separate the specific contribution of education from correlated factors such as income and healthcare access. Financial hardship and lower income have likewise been linked to greater psychological distress in several settings (Kicia et al., 2021; Wang et al., 2023; Burdecka & Szablewska, 2025), including evidence from Nigeria that financial barriers restrict access to post miscarriage counselling altogether (Gbadebo, 2020). Marital status shows a more complicated pattern. In Nigeria, marital status may have a more complex relationship with psychological distress, particularly where marital tension or in-law relationships add to the difficulties associated with reproductive loss (Gbaranor et al., 2025).

Taken together, previous studies show that recurrent miscarriage is associated with substantial psychological distress but less is known about which sociodemographic characteristics are associated with greater distress. This is particularly true in Nigeria, where evidence on women with recurrent miscarriage remains limited. Existing research has reported high levels of depression, anxiety and psychological distress among women who experience recurrent miscarriage (Qu et al., 2021; Shetty et al., 2025), and women with two or more losses have been found to report greater distress than those with a single loss (Aventin et al., 2025). However, there is still limited evidence on whether sociodemographic and socioeconomic characteristics are associated with differences in depression, anxiety and stress among women with recurrent miscarriage in Nigeria. This study therefore examined these associations among women in Lagos State.

This study therefore addressed two objectives:

- i. To measure levels of depression, anxiety and stress among women with recurrent miscarriage in Lagos State, Nigeria.

- ii. To examine the association between sociodemographic and socioeconomic characteristics (age, marital status, highest level of education, employment status and household income) and levels of depression, anxiety and stress in this population.

METHOD

Study Design and Setting

This study employed a quantitative cross-sectional survey design to examine levels of depression, anxiety and stress, and their association with sociodemographic and socioeconomic characteristics, among women with recurrent miscarriage in Lagos State, Nigeria. Lagos State was selected because of its large population and the availability of reproductive healthcare facilities serving women from different socioeconomic, educational and cultural backgrounds

Study Population and Eligibility Criteria

The target population comprised women with a history of two or more miscarriages resident in Lagos State. Eligible participants were aged 18–50 years, resident in Lagos State, had experienced two or more pregnancy losses before 24 weeks of gestation consistent with contemporary international clinical guidelines (ASRM, 2020; ESHRE, 2023), were able to read and understand English, and were able to provide voluntary informed consent. No restriction was placed on time elapsed since the most recent miscarriage. Women were excluded if they self-reported a current diagnosis of a severe mental health condition (e.g., a psychotic disorder or bipolar disorder), reported current inpatient or intensive outpatient psychiatric treatment, resided outside Lagos State, or declined informed consent.

The age range of 18–50 years was selected to include women of reproductive age for whom pregnancy and pregnancy loss remain relevant. This range is also broadly consistent with previous research on psychological distress following recurrent pregnancy loss (Issakhanova et al., 2023). As no comprehensive registry or population-level database of women with recurrent miscarriage exists for Lagos State, the exact size of the target population could not be established. A non-probability purposive sampling approach was therefore adopted. Given this sampling approach, the findings should be interpreted as describing this sample rather than as population-level prevalence estimates for women with recurrent miscarriage in Lagos State.

Sampling and Recruitment

Participants were recruited through five healthcare facilities (comprising private, public and specialist hospitals offering obstetric and gynaecological services) and online maternal health support networks operating within Lagos State. Data were collected via both facility-based and online channels over a four-month period, from July to October 2025. Women recruited through healthcare facilities completed paper-based questionnaires during clinic visits, with a researcher present to clarify queries. Online participants accessed the questionnaire via a secure link shared through maternal health support networks and completed it independently.

Sample Size

An a priori power analysis was conducted using G*Power Version 3.1 (Faul et al., 2009), incorporating a medium effect size ($f^2 = 0.15$), $\alpha = .05$ and power = .80 (Cohen, 1988),

yielding a minimum requirement of 103 participants. We set a recruitment target of at least 150 to allow for anticipated data loss. In total, we collected 259 questionnaires. Questionnaires were excluded where more than 20% of DASS-21 items were left unanswered, where entire sections were blank, or where clear evidence of patterned responding was present (e.g., identical responses across all items on a scale). This resulted in the exclusion of 59 questionnaires (22.8%), yielding a final analytic sample of 200 participants (120 recruited via paper-based administration; 80 recruited online). Missing data among retained questionnaires were minimal (<2%), and we applied listwise deletion for individual scale scores when isolated items were missing.

Instruments

Sociodemographic and socioeconomic questionnaire. A researcher-developed questionnaire collected information on age, marital status, highest level of education, employment status, monthly household income (in Nigerian naira, ₦), number of previous miscarriages, and time since the most recent miscarriage.

Depression Anxiety Stress Scales–21 (DASS-21). Depression, anxiety and stress were assessed using the DASS-21 (Lovibond & Lovibond, 1995), a 21-item self-report instrument comprising three seven-item subscales. Items are rated on a four-point Likert scale (0 = "Did not apply to me at all" to 3 = "Applied to me very much or most of the time"). Subscale scores are obtained by summing relevant items and multiplying by two, yielding a possible range of 0–42 per subscale, with higher scores indicating greater symptom severity. Established severity classifications were applied (Depression: normal 0–9, mild 10–13, moderate 14–20, severe 21–27, extremely severe 28+; Anxiety: normal 0–7, mild 8–9, moderate 10–14, severe 15–19, extremely severe 20+; Stress: normal 0–14, mild 15–18, moderate 19–25, severe 26–33, extremely severe 34+). The DASS-21 measures current symptom severity rather than serving as a diagnostic instrument.

Items were adapted from their original wording to incorporate a brief contextual reference to recurrent miscarriage, so that participants could apply items specifically to their experience of repeated pregnancy loss. This represents a minor deviation from standard administration; internal consistency was therefore assessed within the present sample rather than relying solely on prior validation evidence.

Instruments were administered in English, the official language of education, healthcare and formal communication in Nigeria; formal translation and back-translation procedures were accordingly not required.

Validity and Reliability

The DASS-21 has demonstrated satisfactory psychometric properties in prior Nigerian samples, with Cronbach's alpha coefficients of 0.81 (depression), 0.89 (anxiety) and 0.78 (stress) reported by Coker et al. (2018). We conducted a pilot study with 10 eligible women who were not included in the main analysis. The pilot assessed instruction clarity, questionnaire length acceptability, and ease of administration, consistent with recommended pilot sample sizes for procedural rather than psychometric testing (Polit & Beck, 2006). The pilot required no substantive changes to the instrument. The research supervisor also reviewed the questionnaire package for relevance, clarity, and suitability before data collection.

Ethical Considerations

The Research Ethics Committee of Universiti Malaysia Terengganu granted ethical approval before data collection, and each participating healthcare facility also granted permission. All procedures conformed to the ethical principles of the Declaration of Helsinki. Participation was voluntary, and we obtained written informed consent from all participants after providing a Participant Information Sheet. Participants could decline or withdraw at any stage without penalty. We collected no identifying information and reported findings in aggregate. Given the emotionally sensitive nature of the topic, we paid particular attention to participants' emotional wellbeing throughout data collection, including the option to skip questions or discontinue participation; we also made information about counselling and psychological support services available where appropriate.

Statistical Analysis

Data were analysed using SPSS version 27.0. Descriptive statistics (means, standard deviations, frequencies and severity category classifications) were used to summarise DASS-21 subscale scores and sociodemographic characteristics, addressing the first study objective. We examined associations between sociodemographic and socioeconomic characteristics and DASS-21 severity categories using Pearson's chi-square test, with effect sizes reported as Cramér's V (0.10–0.29 = small, 0.30–0.49 = medium, ≥ 0.50 = large; Cohen, 1988). When expected cell frequencies fell below 5 in more than 20% of cells, Fisher's exact test was used instead of Pearson's chi-square test, and this substitution is noted alongside the relevant results. Statistical significance was set at $p < .05$, two-tailed. Because this study used bivariate categorical tests only, findings are reported as associations between sociodemographic characteristics and levels of depression, anxiety, and stress, consistent with the cross-sectional design; no causal or predictive claims are made.

FINDINGS

Sociodemographic and Reproductive Characteristics

Table 1: The sociodemographic and reproductive history characteristics of the 200 participants.

Variable	Category	n	%
Age	18–25 years	48	24.0
	26–35 years	78	39.0
	36–45 years	48	24.0
	46–50 years	26	13.0
	Total	200	100.0
Marital Status	Single	72	36.0
	Married	104	52.0
	Divorced	24	12.0
	Total	200	100.0
Employment Status	Full-time	68	34.0
	Part-time	52	26.0
	Self-employed	42	21.0
	Unemployed/Student	38	19.0
	Total	200	100.0
Highest Level of Education	No formal education	2	1.0
	Primary education	6	3.0
	Secondary education	44	22.0

	Tertiary education	148	74.0
	Total	200	100.0
Monthly Household Income	₹25,000–₹50,000	58	29.0
	₹51,000–₹80,000	62	31.0
	₹81,000–₹100,000	52	26.0
	Above ₹100,000	28	14.0
	Total	200	100.0
Number of Miscarriages	2 miscarriages	138	69.0
	3 miscarriages	50	25.0
	4 or more miscarriages	12	6.0
	Total	200	100.0
Time Since Most Recent Miscarriage	Less than 6 months	20	10.0
	6–12 months	106	53.0
	1–3 years	50	25.0
	3–5 years	18	9.0
	5+ years	6	3.0
	Total	200	100.0

Note. No participants reported separated or widowed status; these categories are omitted as they were not represented in the sample.

Table 2: Comparison of Sociodemographic Characteristics by Data Collection Channel (n = 200)

Characteristic	Paper-Based (n=120) n (%)	Online (n=80) n (%)	χ^2 / Fisher's p	Decision
Age group (18–35 vs 36–50)	78 (65.0) vs 42 (35.0)	48 (60.0) vs 32 (40.0)	.455	ns
Marital status (Married vs other)	66 (55.0) vs 54 (45.0)	38 (47.5) vs 42 (52.5)	.290	ns
Educational level (Tertiary vs below)	90 (75.0) vs 30 (25.0)	58 (72.5) vs 22 (27.5)	.673	ns
Employment (Employed vs Unemployed/Student)	88 (73.3) vs 32 (26.7)	74 (92.5) vs 6 (7.5)	.001	Significant*

Note. * $p < .05$.

A comparison of key sociodemographic characteristics between the paper-based (n = 120) and online (n = 80) recruitment channels found no significant differences in age group, marital status or highest level of education (all $p > .05$). Employment status differed significantly between channels (χ^2 /Fisher's $p = .001$), with a higher proportion of online participants in employment (Table 2).

Internal Consistency Reliability

We assessed internal consistency using Cronbach's alpha (Table 3). All three DASS-21 subscales exceeded the recommended minimum threshold of 0.70 (Nunnally, 1978).

Table 3: Internal Consistency Reliability Coefficients for the DASS-21 (n = 200)

Subscale	No. of Items	Cronbach's α	Interpretation
Depression	7	0.84	Good
Anxiety	7	0.81	Good
Stress	7	0.79	Acceptable

Note. Items were adapted from their original wording to include a brief contextual reference to recurrent miscarriage; coefficients reflect this adapted version of the instrument.

Levels of Depression, Anxiety and Stress

Table 4 presents descriptive statistics for DASS-21 subscale scores, and Table 5 presents the frequency distribution by severity category.

Table 4: Descriptive Statistics for DASS-21 Subscale Scores (n = 200)

Subscale	Mean	SD	Min	Max	Skewness	Kurtosis
Depression	18.64	8.72	0	42	0.24	-0.31
Anxiety	20.36	9.18	0	42	0.18	-0.44
Stress	17.82	8.95	0	42	0.31	-0.28

Note. Subscale scores range from 0 to 42.

Table 5: Frequency Distribution of DASS-21 Severity Categories (n = 200)

Category	Depression n (%)	Anxiety n (%)	Stress n (%)
Normal	27 (13.5)	22 (11.0)	80 (40.0)
Mild	26 (13.0)	6 (3.0)	44 (22.0)
Moderate	88 (44.0)	60 (30.0)	36 (18.0)
Severe	33 (16.5)	32 (16.0)	26 (13.0)
Extremely Severe	26 (13.0)	80 (40.0)	14 (7.0)
Total	200 (100.0)	200 (100.0)	200 (100.0)

Note. Depression: normal = 0–9, mild = 10–13, moderate = 14–20, severe = 21–27, extremely severe = 28+. Anxiety: normal = 0–7, mild = 8–9, moderate = 10–14, severe = 15–19, extremely severe = 20+. Stress: normal = 0–14, mild = 15–18, moderate = 19–25, severe = 26–33, extremely severe = 34+.

Substantial psychological distress was evident across all three dimensions. For depression, 44.0% of participants scored in the moderate range, 16.5% severe and 13.0% extremely severe; only 13.5% scored within the normal range. For anxiety, 40.0% scored in the extremely severe range and a further 30.0% in the moderate range; only 11.0% scored within the normal range. Anxiety therefore showed the highest level of severe symptoms in this sample. For stress, 40.0% scored within the normal range, while the remaining 60.0% fell into mild-to-extremely-severe categories.

An additional analysis examined co-occurring distress across all three dimensions simultaneously (Depression ≥ 14 , Anxiety ≥ 10 , Stress ≥ 19). Of the 200 participants, 64 (32.0%) met the moderate-or-above threshold on all three subscales concurrently, indicating that nearly

one in three women in this sample experienced depression, anxiety and stress together.

Associations between Sociodemographic Characteristics and Psychological Distress

Associations were tested using Pearson's chi-square, with Fisher's exact test applied where more than 20% of cells had expected counts below 5. Full cross-tabulations are presented below for the four significant associations; results for non-significant associations are summarised in Table 10.

Age and Anxiety

Table 6: Cross-Tabulation of Age and Anxiety Severity (n = 200)

Age	Normal	Mild	Moderate	Severe	Extremely Severe	Total
18–25 years	10	2	14	8	14	48
26–35 years	5	2	30	14	27	78
36–45 years	4	2	12	6	24	48
46–50 years	3	0	4	4	15	26
Total	22	6	60	32	80	200

$\chi^2 = 22.88$, $df = 12$, $p = .029$, Cramér's $V = 0.219$ (small effect)

Note. The 46–50 years/Mild cell had an observed count of 0; fewer than 20% of cells overall had expected counts below 5. Pearson's chi-square was therefore appropriate.

Age was significantly associated with anxiety severity. The proportion of women in the extremely severe category was highest among those aged 46–50 years. Age was not significantly associated with depression ($\chi^2 = 20.44$, $df = 12$, $p = .059$, Cramér's $V = 0.207$) or stress ($\chi^2 = 20.10$, $df = 12$, $p = .065$, Cramér's $V = 0.205$).

Marital Status and Depression

Table 7: Cross-Tabulation of Marital Status and Depression Severity (n = 200)

Marital Status	Normal	Mild	Moderate	Severe	Ext. Severe	Total
Single	14	12	32	10	4	72
Married	12	13	48	19	12	104
Divorced	1	1	8	4	10	24
Total	27	26	88	33	26	200

$\chi^2 = 17.84$, $df = 8$, $p = .023$, Cramér's $V = 0.211$ (small effect)

Note. The Divorced/Normal and Divorced/Mild cells had observed counts of 1 each; fewer than 20% of cells overall had expected counts below 5. Pearson's chi-square was therefore appropriate.

Marital status was significantly associated with depression severity, with divorced women showing higher rates of severe and extremely severe depression than married or single women. No significant association was found between marital status and anxiety ($\chi^2 = 5.12$, df

= 8, $p = .745$, Cramér's $V = 0.113$) or stress ($\chi^2 = 10.88$, $df = 8$, $p = .209$, Cramér's $V = 0.165$).

Highest Level of Education, Depression and Stress

Table 8: Cross-Tabulation of Highest Level of Education and Depression Severity ($n = 200$)

Educational Level	Normal	Mild	Moderate	Severe	Ext. Severe	Total
No formal education	0	0	0	1	1	2
Primary education	0	0	2	2	2	6
Secondary education	4	4	22	10	4	44
Tertiary education	23	22	64	20	19	148
Total	27	26	88	33	26	200

Fisher's exact $p = .019$, Cramér's $V = 0.225$ (small effect)

Note. 70.0% of cells had expected counts below 5, owing to the small No Formal Education ($n = 2$) and Primary Education ($n = 6$) subgroups; Fisher's exact test was applied in place of Pearson's chi-square.

Table 9: Cross-Tabulation of Highest Level of Education and Stress Severity ($n = 200$)

Educational Level	Normal	Mild	Moderate	Severe	Ext. Severe	Total
No formal education	0	0	1	1	0	2
Primary education	0	1	2	2	1	6
Secondary education	10	8	10	12	4	44
Tertiary education	70	35	23	11	9	148
Total	80	44	36	26	14	200

Fisher's exact $p = .024$, Cramér's $V = 0.222$ (small effect)

Note. 70.0% of cells had expected counts below 5; Fisher's exact test was used instead of Pearson's chi-square.

Highest level of education was significantly associated with both depression and stress. Participants with lower levels of education had higher proportions of severe and extremely severe depression and stress. No significant association was found between highest level of education and anxiety (Fisher's exact $p = .324$, Cramér's $V = 0.169$).

Summary of Non-Significant Associations

Employment status was not significantly associated with depression ($\chi^2 = 15.89$, $df = 12$, $p = .197$, Cramér's $V = 0.182$), anxiety ($\chi^2 = 19.00$, $df = 12$, $p = .089$, Cramér's $V = 0.200$) or stress ($\chi^2 = 13.78$, $df = 12$, $p = .315$, Cramér's $V = 0.170$). Household income was not significantly associated with depression (Fisher's exact $p = .950$, Cramér's $V = 0.104$), anxiety (Fisher's exact $p = .171$, Cramér's $V = 0.185$) or stress (Fisher's exact $p = .210$, Cramér's $V = 0.181$).

Table 10: Summary of All Chi-Square/Fisher's Exact Test Results (n = 200)

Variable	Outcome	Test Used	p	Cramér's V	Association
Age	Depression	Pearson χ^2	.059	0.207	Not significant
Age	Anxiety	Pearson χ^2	.029*	0.219	Significant (small)
Age	Stress	Pearson χ^2	.065	0.205	Not significant
Marital Status	Depression	Pearson χ^2	.023*	0.211	Significant (small)
Marital Status	Anxiety	Pearson χ^2	.745	0.113	Not significant
Marital Status	Stress	Pearson χ^2	.209	0.165	Not significant
Highest Education	Depression	Fisher's Exact	.019*	0.225	Significant (small)
Highest Education	Anxiety	Fisher's Exact	.324	0.169	Not significant
Highest Education	Stress	Fisher's Exact	.024*	0.222	Significant (small)
Employment	Depression	Pearson χ^2	.197	0.182	Not significant
Employment	Anxiety	Pearson χ^2	.089	0.200	Not significant
Employment	Stress	Pearson χ^2	.315	0.170	Not significant
Income	Depression	Fisher's Exact	.950	0.104	Not significant
Income	Anxiety	Fisher's Exact	.171	0.185	Not significant
Income	Stress	Fisher's Exact	.210	0.181	Not significant

Note. * $p < .05$. Cramér's V: 0.10–0.29 = small, 0.30–0.49 = medium, ≥ 0.50 = large (Cohen, 1988). Fisher's exact test applied where $>20\%$ of cells had expected counts <5 .

In total, four of the fifteen associations tested reached statistical significance: age with anxiety, marital status with depression, and highest level of education with both depression and stress. Employment status and household income were not significantly associated with any of the three psychological factors examined.

DISCUSSION

Levels of Depression, Anxiety and Stress

This study's first objective was to measure levels of depression, anxiety and stress among women with recurrent miscarriage in Lagos State. Levels of depression, anxiety and stress were generally high in this sample, particularly for anxiety and depression. The findings are broadly consistent with previous Nigerian and international studies, although some of the levels observed here were higher (Farren et al., 2018; Qu et al., 2021; Akwuruoha et al., 2025).

Compared with Eleje et al.'s (2023) Nigerian case-control study using the same DASS-21 instrument, in which stress showed the strongest association with adverse pregnancy outcomes. The present sample differed in that anxiety, rather than stress, emerged as the most severely affected dimension. This difference may stem from the study populations and timing. Eleje et al. examined women during a subsequent pregnancy, whereas the present sample was assessed across a broader post-loss window. The difference may also reflect variation between Nigerian study populations. Against the wider international evidence, depression and anxiety levels in this sample exceed the pooled estimates reported in Shetty et al.'s (2025) meta-analysis of mixed single and recurrent loss populations. This fits with the expectation that recurrent loss specifically carries a heavier psychological burden than single miscarriage.

The finding that 40.0% of participants were in the extremely severe anxiety category deserves attention. Several factors may help explain this result, although the present study cannot establish why anxiety was particularly high. In Nigeria, expectations surrounding fertility and motherhood may add to the emotional burden associated with recurrent miscarriage (Ibisomi & Mudege, 2014; Odunsi & Hosek, 2024). Recurrent pregnancy loss may also lead to continuing worry about whether a future pregnancy will result in another miscarriage. This concern may be greater when the cause of previous losses remains unclear, as a large proportion of recurrent miscarriage cases remain medically unexplained (Dobson & Jayaprakasan, 2018). In addition, limited access to psychological support and experiences of stigma, blame and family pressure may leave some women without adequate support (Gbaranor et al., 2025; Nwankwor & Okafocha, 2026). These explanations should be interpreted cautiously because this study did not directly examine them. Qualitative research could provide further insight into the experiences that contribute to anxiety among women with recurrent miscarriage in Nigeria.

The lower level of stress compared with depression and anxiety may have several explanations. The stress subscale measures symptoms such as tension, irritability and over-arousal, which may not have been experienced to the same extent as the symptoms assessed by the depression and anxiety subscales. Other factors, including coping resources that were not measured in this study, may also have contributed.

Sociodemographic and Socioeconomic Correlates of Psychological Distress

The second objective examined the association between sociodemographic and socioeconomic characteristics and levels of depression, anxiety and stress. Findings provided partial support for this objective. Age was associated with anxiety but not depression or stress. Marital status was associated with depression but not anxiety or stress. Highest level of education was associated with both depression and stress but not anxiety. Neither employment status nor household income was associated with any of the three psychological factors examined. Because this study relied on bivariate chi-square and Fisher's exact tests rather than multivariable modelling, these findings describe associations observed within this sample rather than independent or predictive effects and should not be read as evidence that any single sociodemographic characteristic causes variation in distress.

The association between age and anxiety was significant, with women aged 46–50 years having a higher proportion of extremely severe anxiety. This finding aligns with studies suggesting that concerns about declining reproductive opportunities may increase with age (Wang et al., 2023; Gao et al., 2020). In the present sample, this pattern may be related to repeated pregnancy loss and a shorter perceived window for a future successful pregnancy.

The association between marital status and depression, with divorced women showing higher rates of severe and extremely severe depression, is particularly relevant within the Nigerian context, where the social and relational consequences of recurrent miscarriage can extend to marital instability and family conflict (Gbaranor et al., 2025). For women whose marriages have ended in a context where recurrent miscarriage was also present, the association may reflect the combined difficulties associated with reproductive loss and relationship disruption, although this explanation could not be tested in the present study. Because this study is cross-sectional, we cannot establish the direction of this association. Recurrent miscarriage may have contributed to marital breakdown, depression may have followed independently from divorce, or both may share common underlying causes.

The association between highest level of education and both depression and stress, with lower educational attainment linked to greater severity, fits with evidence suggesting that differences in health literacy, access to information and healthcare resources may be related to educational attainment (Kicia et al., 2021; Wang et al., 2023; Mutiso et al., 2019). Because education is also closely linked to income, employment, and healthcare access more broadly, this association may partly reflect broader socioeconomic advantage rather than education alone. The present cross-sectional design cannot separate these overlapping influences.

The lack of a significant association between employment status or household income and the three distress outcomes differs from some international studies (Kicia et al., 2021; Wang et al., 2023; Burdecka & Szablewska, 2025). However, similar findings have also been reported. This may partly reflect the income levels and employment patterns of the women in the present sample. Most participants were employed, and household income differences may have been limited. Employment and income may also influence psychological distress indirectly through factors such as access to healthcare and the ability to afford counselling (Gbadebo, 2020). The present study did not examine these factors.

Together, these findings should be understood as describing patterns within this specific, purposively sampled group of 200 women in Lagos State, rather than as population-level prevalence or association estimates for women with recurrent miscarriage in Nigeria more broadly.

Strengths and Limitations

This study has several strengths. These include a validated instrument with good internal consistency in this sample, a dual recruitment strategy combining facility-based and online participants that allowed recruitment beyond hospital-based settings, and explicit use of Fisher's exact test where small, expected cell counts would otherwise have compromised the validity of chi-square testing.

Several limitations should nonetheless be acknowledged. First, the purposive, non-probability sampling strategy means findings describe this sample and cannot be generalised as population-level prevalence estimates for Lagos State or Nigeria more broadly. Second, the cross-sectional design prevents any causal or directional interpretation of the associations reported. We report all findings as associations rather than predictive or causal relationships. Third, although the two recruitment channels were broadly comparable on most sociodemographic characteristics, they differed significantly in employment status, which may have introduced some recruitment-related bias in the findings for employment status. Fourth, we adapted the DASS-21 items with contextual wording referring to recurrent miscarriage. Internal consistency was reassessed in this sample, but this adaptation still deviates from

standard administration and may limit direct comparability with studies using the unmodified instrument. Finally, reliance on self-report measures and English-language administration may have excluded women with lower English proficiency, potentially resulting in a sample with a higher proportion of more educated participants. This possibility is consistent with the high proportion of tertiary-educated women observed in the sample.

CONCLUSION

Among the 200 women with recurrent miscarriage included in this study, depression, anxiety and stress were common, with anxiety showing the highest proportion of extremely severe symptoms. Age was significantly associated with anxiety, marital status with depression, and highest level of education with depression and stress. Employment status and household income were not significantly associated with any of the three psychological outcomes. The findings suggest that psychological support may be useful within reproductive healthcare for women experiencing recurrent miscarriage, particularly in addressing anxiety. However, interpret the findings in light of the study's purposive sampling and cross-sectional design. Future research using probability-based sampling, longitudinal designs or multivariable analyses could help determine whether these associations are also present in the wider population of Nigerian women experiencing recurrent miscarriage.

DECLARATIONS

The Research Ethics Committee of Universiti Malaysia Terengganu granted ethics approval, and each participating site granted facility-level permissions. We obtained written informed consent from all participants. We also declare that there is no conflict of interest regarding the publication of this paper. This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

REFERENCES

- Akwuruoha, E. M., Onwube, O. C., Akwuruoha, C. U., & Airaodion, A. I. (2025). Prevalence, causes and psychological effects of miscarriage among women in Abia State University Teaching Hospital, Aba, Nigeria. *American Journal of Biomedical Science & Research*, 27(5), Article 003603. <https://doi.org/10.34297/AJBSR.2025.27.003603>
- Al-Busaidi, M., Al-Ghafri, W., Al Shukri, M., Al-Sinawi, H., Al-Ghabshi, R., & Gowri, V. (2026). The prevalence of depression, anxiety, and stress in women with recurrent pregnancy loss and infertility compared to normal controls in Oman: A prospective, cross-sectional study. *Healthcare*, 14(4), 453. <https://doi.org/10.3390/healthcare14040453>
- American Society for Reproductive Medicine. (2020). Definitions of infertility and recurrent pregnancy loss: A committee opinion. *Fertility and Sterility*, 113(3), 533–535. <https://doi.org/10.1016/j.fertnstert.2019.11.025>
- Aventin, Á., Robinson, M., White, J., & Galeotti, M. (2025). Recurrent pregnancy loss, psychological distress and wellbeing support for women: A mixed-methods analysis. *BMC Women's Health*, 25, Article 079. <https://doi.org/10.1186/s12905-025-04079-2>
- Burdecka, J., & Szablewska, A. (2025). Sociodemographic predictors of postpartum post-traumatic stress symptoms Cross-sectional study. *Frontiers in Psychology*, 16, Article 1681808. <https://doi.org/10.3389/fpsyg.2025.1681808>

- Cohen, J. (1988). Statistical power analysis for the behavioral sciences (2nd ed.). Lawrence Erlbaum Associates.
- Coker, A. O., Coker, O. O., & Sanni, D. (2018). Psychometric Properties of the 21-Item Depression Anxiety Stress Scale (DASS-21). *African Research Review*, 12, 135. <https://doi.org/10.4314/afrev.v12i2.13>
- Dimitriadis, E., Menkhorst, E., Saito, S., Kutteh, W. H., & Brosens, J. J. (2020). Recurrent pregnancy loss. *Nature Reviews Disease Primers*, 6, Article 98. <https://doi.org/10.1038/s41572-020-00228-z>
- Dobson, S. J. A., & Jayaprakasan, K. M. (2018). Aetiology of recurrent miscarriage and the role of adjuvant treatment in its management: A retrospective cohort review. *Journal of Obstetrics and Gynaecology*, 38(7), 967–974. <https://doi.org/10.1080/01443615.2018.1424811>
- Eleje, G. U., Oguejiofor, C. B., Oriji, S. O., Ekwuazi, K. E., Ugwu, E. O., Igbodike, E. P., Malachy, D. E., Nwankwo, E. U., Onah, C. E., Ugboaja, J. O., Ikechebelu, J. I., & Nwagha, U. I. (2023). Depression, anxiety, and stress and adverse pregnancy outcomes in pregnant women with a history of recurrent pregnancy loss in Nigeria. *The International Journal of Psychiatry in Medicine*, 59(3), 303–324. <https://doi.org/10.1177/00912174231199215>
- ESHRE Working Group on RPL, Bender Atik, R., Christiansen, O. B., Elson, J., Kolte, A. M., Lewis, S., Middeldorp, S., Nelen, W., Peramo, B., Quenby, S., Vermeulen, N., & Goddijn, M. (2023). ESHRE guideline: Recurrent pregnancy loss: An update in 2022. *Human Reproduction Open*, 2023(1), hoad002. <https://doi.org/10.1093/hropen/hoad002>
- Farren, J., Mitchell-Jones, N., Verbakel, J. Y., Timmerman, D., Jalmbrant, M., & Bourne, T. (2018). The psychological impact of early pregnancy loss. *Human Reproduction Update*, 24(6), 731–749. <https://doi.org/10.1093/humupd/dmy025>
- Faul, F., Erdfelder, E., Buchner, A., & Lang, A.-G. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavioral Research Methods*, 41(4), 1149–1160. <https://doi.org/10.3758/BRM.41.4.1149>
- Fernández-Basanta, S., Dahl-Cortizo, C., Coronado, C., & Movilla-Fernández, M.-J. (2023). Pregnancy after perinatal loss: A meta-ethnography from a women's perspective. *Midwifery*, 124, Article 103762. <https://doi.org/10.1016/j.midw.2023.103762>
- Gao, L., Qu, J., & Wang, A. Y. (2020). Anxiety, depression and social support in pregnant women with a history of recurrent miscarriage: A cross-sectional study. *Journal of Reproductive and Infant Psychology*, 38(5), 497–508. <https://doi.org/10.1080/02646838.2019.1652730>
- Gbadebo, F. Y. (2020). Profile of abortion seekers and their views on the financial cost of induced abortions: Implications for preventing unsafe abortions among young people in Accra, Ghana. *Public Health*, 183, 112–117. <https://doi.org/10.1016/j.puhe.2020.04.008>
- Gbaranor, K. B., Imarhiagbe, O. C., Ore, A. C., John, E. E., Pepple, B., Ekeng, O. B., Barinua-Gbaranor, N. P., Mube, A. W., Etuk, M. S., Okoish, O. S., Timi-Oladipo, A., Monday, S. N., Oworji, B. I., & Osoma, S. C. (2025). Psychological impact of recurrent pregnancy loss among married women in South-South Nigeria. *South Asian Research Journal of Anatomy, Medicine and Surgery*, 7(6), 25–30. <https://doi.org/10.36346/sarjams.2025.v07i06.005>

- Ibisomi, L., & Mudege, N. N. (2014). Childbearing at all costs: Perceptions of causes and consequences of infertility in an African setting. *African Journal of Reproductive Health*, 18(2), 76–87.
- Igbokwe, C., Aniago, E., Chidi-Igbokwe, M.-I. A., Abada, F. C., Arah, A., Aniago, M., & Agbo, J. C. (2026). Philosophical complexities and economic realities of mothering: A Nigerian mother's travails and tenacity in Funke Akindele's *A Tribe Called Judah*. *AGATHOS*, 17(1), 111–125. <https://doi.org/10.5281/zenodo.19911977>
- Ikeanyi, E. M., & Ikobho, E. H. (2021). Age at menopause and the correlates of natural menopause among urban and rural women in the southern Nigeria. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*, 10(4), 1266–1271. <https://doi.org/10.18203/2320-1770.ijrcog20211098>
- Issakhanova, A., Issanov, A., Ukybassova, T., Kaldygulova, L., Marat, A., Imankulova, B., Kamzayeva, N., Almawi, W. Y., & Aimagambetova, G. (2023). Depression, anxiety, and stress in Kazakhstani women with recurrent pregnancy loss: A case–control study. *Journal of Clinical Medicine*, 12(2), Article 658. <https://doi.org/10.3390/jcm12020658>
- Kicia, M., Skurzak, A., Korzyńska-Piętas, M., Palus, A., & Iwanowicz-Palus, G. (2021). Assessment of the relationship between socio-demographic factors and intensity of perceived stress in a group of women hospitalized due to miscarriage. *Medycyna Ogólna i Nauki o Zdrowiu*, 27(3), 176–182. <https://doi.org/10.26444/monz/140310>
- Lovibond, S. H., & Lovibond, P. F. (1995). *Manual for the Depression Anxiety Stress Scales* (2nd ed.). Psychology Foundation.
- Mutiso, S. K., Murage, A., & Mwaniki, A. M. (2019). Factors associated with a positive depression screen after a miscarriage. *BMC Psychiatry*, 19(1), Article 8. <https://doi.org/10.1186/s12888-018-1991-5>
- Nunnally, J. C. (1978). *Psychometric Theory* (2nd ed.). New York: McGraw-Hill.
- Nwankwor, J. C., & Okafocha, O. C. (2026). Faith, fertility, and stigma: A critical examination of the Church's response to childlessness in Nigeria. *Ohazurume: Unizik Journal of Culture and Civilization*, 5(2), 138]. <https://journals.ezenwaohaetorc.org/index.php/UJOCC/article/view/3883/3994>
- Odunsi, I. A., & Hosek, A. M. (2024). Re-negotiating self-identity: Exploring the role of motherhood-indicative labels in constructing Nigerian mother's identity. *Journal of Family Communication*, 24(1–2), 65–81. <https://doi.org/10.1080/15267431.2024.2319126>
- Oigene Michael Sunday, Gandu Ahmadu Aminu, Orji-Okafor, Euphemia Cheta, Felix Fiavor, Nura Ishaka, Rukkaya Abdullahi Bala, and Mohammed Dantani Dangana. 2026. “Psychological Distress and Social Burden of Infertility: A Cross-Sectional Study of Women in Zamfara State, Nigeria”. *International Neuropsychiatric Disease Journal* 23 (4):58-69. <https://doi.org/10.9734/indj/2026/v23i4567>.
- Polit, D. F., & Beck, C. T. (2006). The content validity index: Are you sure you know what's being reported? Critique and recommendations. *Research in Nursing & Health*, 29(5), 489–497. <https://doi.org/10.1002/nur.20147>
- Qu, J., Weng, X., & Gao, L.-L. (2021). Anxiety, depression and social support across pregnancy in women with a history of recurrent miscarriage: A prospective study.

International Journal of Nursing Practice, 28(2), Article e12997.
<https://doi.org/10.1111/ijn.12997>

- Sánchez-Ortí, J. V., Bellver-Pérez, A., & Moreno-Maldonado, E. (2026). Mental health, well-being, and sexual health in recurrent pregnancy loss: A systematic review. *Clinical and Health*, 37, Article e260723. <https://doi.org/10.5093/clh2026a9>
- Shetty, A., Issac, A., Dhiraaj, S., Vr, V., Thimappa, L., Balakrishnan, D., Nath, B., Sinha, S., Singh, S., Mishra, P., & Halemani, K. (2025). Global prevalence of post-miscarriage anxiety, depression, and stress: A systematic review and meta-analysis. *Journal of Global Health*, 15, Article 04245. <https://doi.org/10.7189/jogh.15.04245>
- Wang, Y., Yang, J., Xiao, Y., Jin, B., Zhang, Y., Xue, J., Chen, Q., & Ai, A. (2023). The association of anxiety, depressive symptoms and sleep disorders with recurrent pregnancy loss: A case-control study. *Archives of Gynecology and Obstetrics*, 307(4), 1221–1230. <https://doi.org/10.1007/s00404-022-06663-y>