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# Effect of Support Groups' Activities on Health Outcomes Among Diabetic Patients Attending Healthcare Institutions in Cross River State, Nigeria

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# EFFECT OF SUPPORT GROUPS' ACTIVITIES ON HEALTH OUTCOMES AMONG DIABETIC PATIENTS ATTENDING HEALTHCARE INSTITUTIONS IN CROSS RIVER STATE, NIGERIA

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## Abstract

**Background:** Despite advances in diabetes management strategies, diabetes self-management often suffers setbacks due to lack of motivation among people living with diabetes globally.
**Aim**: The effect of support groups' activities on glycaemic control, adherence to therapy, diabetes distress, hospital revisits, and health outcomes of diabetes patients was assessed.

**Method:** We employed an analytical cross-sectional study design and a multi-stage sampling technique to select 150 known adult type-2 diabetics into a support group and a non-support group, who attended healthcare facilities in Cross River State, from January to July, 2025. Self-administered, Semi-structured questionnaires were used to obtain data, while blood samples were collected for HbA1c assay. Descriptive and inferential statistics were performed with SPSS version 25. Ethical approval (CRS/MH/HREC/2024/VOL.2/036) and informed consent were obtained.

**Results:** There were 150 adult diabetics aged 30-71 years, mostly, 54(36.0%), within the 50-59 years age range and predominantly female, 83(55.3%). Participants were equally assigned, 75(50.0%) into support and non-support groups. Overall, 79 (52.7%) had good glycaemic control (HbA1c <7%). There was higher glycaemic control (HbA1c <7%, mean = 5.7%), medication adherence (60.0%), and hospital revisits in six months in the support group than in the non-support group. There was a statistically significant association between support group participation and adherence to therapy ($p<0.001$). Statistically significant association of glycaemic control with Age ($p=<0.016$), marital status ($p=<0.030$), and educational level ($p=<0.012$) was observed in the Support group.

**Conclusion:** Support group's activities had positive effects on diabetes self-management. Enrollment and participation in support groups by diabetics should be encouraged.

**Keywords:** Diabetes, Glycaemic control, Support groups, non-support groups, diabetes-related distress

## Introduction

Diabetes is a chronic metabolic disease of global public health concern, characterized by low utilization of glucose by tissues, which stems from an absolute or relative lack of insulin in the body(1, 2). Among adults aged 20 to 79 years, a diabetes prevalence of 10.5% has been reported globally(3), with 14.2 million affected among Africans(4). It is projected that about 783 million people will be affected by diabetes by the year 2045(5). About 24 million (one in 22) Africans and 1.6 million (one in 53) Nigerians are already diabetic, with Southern Cross River State having about 6.9% prevalence(4). Due to rapid economic growth, urbanization, nutrition transition, and changes in lifestyle factors, people in low- and middle-income countries (LMICs) are at high risk of developing diabetes. Diabetes is associated with high mortality, and literature shows that in 2021 alone, there were about 6.7 million mortalities globally, out of which 416,000 were in Africa(6). Living with diabetes can be a difficult situation even in areas with healthcare access and resource availability, and emotional burden termed "diabetes-related distress" is common, which greatly affects treatment outcomes negatively(7, 8). Diabetes-related distress is an undesired experience, and about 36% of those with type 2 diabetes (T2DM) have high diabetes-related distress, especially among females(9). Most people living with T2DM neglect the recommended measures and medication regimen due to fatigue from prolonged use, and dissatisfaction with treatment outcomes (10). Some studies have reported that the majority of people with diabetes had low medication adherence at alarming proportions, resulting in uncontrolled hyperglycemia and long-term complications, increasing morbidity and premature mortality, with consequent increased expenditure on health services (3, 11). Therefore, the increasing prevalence of diabetes highlights the need for comprehensive support systems that can address these unique

challenges(12), Though Healthcare providers (Doctors, Nurses) have been the major drivers of diabetes management and promoters of patients' self-care management approaches, they fall short of meeting the recommended globally accepted target of HbA1c <8.0% in people living with diabetes (PLWD)(8). Peer support groups' approach to diabetes self-management is now receiving widespread recognition and attention, as it provides adequate contact time to sustain newly learned behaviours(13). Peer support, which is described as the transfer of acquired knowledge, through experience of a certain behaviour or coping strategy towards a problem, to other people with similar experiences and identities, has been shown to play an essential role in helping PLWD cope with the physical, emotional, and psychological aspects of the chronic condition (8, 14). Despite the perceived successes of peer support groups on type 2 diabetes self-management, there is a paucity of data, and studies on the effect of support groups on diabetes management in Cross River State could not be cited. Additionally, peer support programs could vary in regions or locations based on cultural differences(8). This research, therefore, was prompted by the inadequate empirical studies of peer support groups that address the unique challenges faced by diabetic patients in Cross River State. To fill this gap, this study evaluated the effect of diabetic support groups on the health outcomes of PLWD in Cross River State, Nigeria.

## Methods

### Study area

The study was conducted in Cross River State, South-South Nigeria. The State has eighteen Local Government Areas, and three senatorial districts, namely Northern, Central, and Southern. The senatorial districts are largely rural except for the Southern Senatorial District which houses the state headquarters situated in Calabar. This is important in the distribution and accessibility of health facilities. Cross River State lies between longitudes 24°.15' and 5°.15'N of the Greenwich meridian and latitudes 8°.15' and 80.25'E of the equator. It is located within the Guinea savannah belt of Nigeria, with a tropical sub-humid climate with both wet and dry seasons, which accounts for the agrarian nature

of the inhabitants. It has a land area of about 9,913 square kilometers and a population of 1,170,609 as of the 2006 National Population Census (Britannica, 2024; Maryland Sister States, 2023). Cross River State is bounded to the north by Benue State, to the west by Abia and Ebonyi States, the Republic of Cameroon to the east, and Akwa Ibom State and the Atlantic Ocean to the south.

**Study design**

An analytical cross-sectional study design was employed to assess the effect of support group participation on diabetic outcomes among patients receiving care in healthcare institutions in Cross River State, Nigeria.

**Study population**

The study population was adults diagnosed with type-2 diabetes attending healthcare institutions in Cross River State, Nigeria. Recruitment lasted for seven months, from January-July, 2025. Eligibility criteria included ambulant patients, not critically ill, or bedridden, non-smokers of tobacco, having been diagnosed and receiving treatment for up to six months or more.

**Sample size determination**

The sample size was determined using the formula for comparing two means(15)

$$\mathrm{N} = \frac{2 * \left(\frac{Za}{2} + Z\beta\right) 2 * d2}{\mathrm{D2}}$$

Where: N = the desired sample size

Za/2 = the critical value for alpha, which is 0.05 = 1.96

$Z_\beta$ = the critical value for 80% power = 0.8416

$D^2$ = effect size expected = 0.46

$d^2$ = standard deviation = 1.0%

Sample size (N) = $2 \times \frac{(1.96 + 0.8416)^2 \times (1.0)^2}{(0.46)^2}$

$$= \frac{2 \times (2.8016)^2 \times 1}{0.2116}$$

$$= 2 \times 7.849 / 0.2116 = 73.3$$

N = 73 per group

Therefore N = 146

The sample size of 146 diabetes patients (73 per group) was required to have an 80% power of detection of the difference in the two groups, and a two-tailed level of statistical significance at 0.05 was set.

5% was used to adjust for non-compliance in both groups:

$$\frac{146}{0.95} = 153$$

150**,** 75 participants per group, to ensure uniformity.

**Sampling procedure**:

A multi-staged sampling technique was used to select participants through simple random sampling, involving stages 1 to 5.

Stage 1: Two senatorial districts were selected (Southern and Northern senatorial districts).

Stage 2: Three local government areas (LGAs) from each senatorial district (three from the Northern senatorial district, and three from the Southern senatorial district).

Stage 3: One Health facility was selected from each LGA. Making three health facilities in the Southern Senatorial district with support groups and three in the northern senatorial district with non-support groups.

Stage 4: In the southern senatorial district, one support group from each health facility was selected, making a total of three support groups.

Stage 5: Twenty-five (25) Type-2 diabetes patients were selected from each of the selected support groups, and twenty-five (25) participants from each of the health facilities, in the clinics, in each of the selected LGAs in the Northern senatorial district. Thus, a total of 75 (25 per facility) diabetic patients were recruited from each group, (75 in the support group and 75 in the non-support group).

**Instrument for data collection**

Quantitative primary data were generated from the respondents for the study. Data were obtained with the use of semi-structured and adopted questionnaires. The questionnaire was in three sections (A, B, and C). Section A was the sociodemographic characteristics (sex, age, marital status, and educational level), number of Hospital revisits, information on support group activities, and collection of respondents' blood samples to test for a change in HbA1c level.

Section B contained the Morisky Medication Adherence scale-8 (MMAS) and the perceived Dietary Adherence Questionnaire (PDAQ), while Section C contained the Diabetes Distress scale-17 (DDS-17, used to measure diabetic distress.

**Pre-testing of the instrument for data collection**

The internal consistency reliability of the Diabetes Distress Scale (DDS) was tested, and was 0.953. The split-half reliability was 0.91, while the stability coefficient was 0.84.

**Data collection procedure**

Face-to-face self-administration of the questionnaire was done with the aid of trained research assistants for the administration and retrieval of the questionnaire. 5.0 mL of blood samples were aseptically collected from the patients into $K_3$EDTA bottles for glycated hemoglobin assay.

**i. HbA1c level**

ANBIO Analyzer was used to measure HbA1c level; two categories of HbA1c level were defined for the analysis: those with < 7% HbA1c level were grouped as those with good glycaemic control, while the poorly controlled HbA1c level were those with ≥ 7%, based on the guideline-recommended target for HbA1c levels (ADA, 2024).

**ii. Morisky Medication Adherence Scale-8 (MMAS)**

Medication adherence was assessed using the Morisky Medication Adherence scale-8 (MMAS). This tool has an 8-item medication adherence questionnaire. Each item is scored either 1 (for a Yes answer) or 0 (for a No answer), with a total score ranging from 0 to 8. Those with an aggregate score of 0 were regarded as having high adherence, those with a 1-2 score were regarded as having moderate adherence, while those with a 3-8 score were regarded as having low adherence.

iii. **Perceived Dietary Adherence Questionnaire (PDAQ)**

Responses on PDAQ were based on a seven-point Likert scale to answer the 9-item questions with a total score ranging from 0 to 63. Higher scores reflected higher adherence, apart from items 4 and 9, which reflected unhealthy choices (that is, foods high in sugar or fat). For these items, higher scores reflected lower adherence; thus, for computing a total PDAQ score, the scores for these items were inverted. Although based on a weekly timeframe, it was anticipated that the PDAQ would reflect usual dietary patterns based on the knowledge that most people consume similar foods from week to week. Participants were classified as dietary adherers when they scored 51 to 63 of the total scores, while those who scored less than 51 were classified as dietary non-adherers(16).

iv. **Diabetes Distress Scale (DDS)**

The DDS score was adapted as a cut-off score and was used as a guide to screen or measure for diabetic distress. The DDS measures a total diabetes distress score plus four subscale scores (emotional burden, regimen distress, interpersonal distress, and physical distress), each addressing a different kind of distress. In scoring the DDS, all responses on the appropriate items were summed up and divided by the number of items in that subscale or all items for the total scale score. The total mean distress scores on DDS were interpreted as: little or no distress (an average score of < 2.0), moderate distress (an

average score of 2.0 – 2.9), and high diabetes distress (an average score of ≥ 3.0).

**Data management**

Statistical Product for Service Solution (SPSS version 25.0) software was used for data analysis. Descriptive statistics were presented in tables, as frequencies, percentages, means, standard deviation, and on charts. Inferential statistics used the Chi-square test and the independent t-test to test the objectives and hypotheses and to examine the relationship between variables. Hypotheses were tested at a 0.05% level of significance.

**Ethical consideration/approval**

Ethical clearance was obtained from the Cross River State Ministry of Health, with approval number CRS/MH/HREC/2024/VOL.2/036. Participation was voluntary, and consent was obtained from all respondents, with respondents' confidentiality guaranteed. Participants were free to opt out at any point in the research without any consequences.

## RESULTS

A total of 150 questionnaires (75 each for those in support groups and those in non-support groups) were administered and were appropriately filled and retrieved for analysis, along with the blood sample collection respondents' form to test for HbA1c, representing 100% response rate.

**Socio-demographic characteristics of respondents**

As shown in Table 1, participants were adult known diabetics, aged 30-71 years, with the majority, 54(36.0%), being 50-59 years, and predominantly female, 83(55.3%), and 67(44.78%), male. In six months, more participants in the non-support group, 70(46.7%), made the fewest clinic revisits (2-3). As the number of hospital revisits increased, the number of participants revisiting the facilities decreased: 4-5 revisits, 55 (35.7%), and ≥ 6 revisits, 25 (16.7%).

The study participants with controlled HbA1c (< 7%) were more than half, 79 (52.7%), while those with uncontrolled HbA1c (≥ 7%) were 71 (47.3%). The participants were evenly distributed, 75(50%) in the non-support group and in the support group.

TABLE 1

Socio-demographic characteristics of respondents

| Characteristics | Frequency (n = 150) | Percentage (%) |
|---|---|---|
| **Age (in years)** | | |
| 30-39 | 15 | 10.0 |
| 40-49 | 40 | 26.7 |
| 50-59 | 54 | 36.0 |
| 60-71 | 41 | 27.3 |
| *Mean age* | *53.3* | |
| | | |
| **Sex** | | |
| Male | 67 | 44.7 |
| Female | 83 | 55.3 |
| | | |
| **Marital status** | | |
| Single | 14 | 9.3 |
| Married | 130 | 86.7 |
| Divorced | 6 | 4.0 |
| | | |
| **Educational status** | | |
| No formal education | 6 | 4.0 |
| Primary | 36 | 24.0 |
| Secondary | 45 | 30.0 |
| Tertiary | 63 | 42.0 |
| | | |
| **Number of hospital re-visits in the last 6 months** | | |
| 2-3 revisits | 70 | 46.7 |
| 4-5 revisits | 55 | 36.7 |
| 6 and above revisits | 25 | 16.7 |
| | | |
| **HbA1c level** | | |
| < 7% | 79 | 52.7 |
| ≥ 7% | 71 | 47.3 |
| *Mean HbA1c= 9.14% in the non-support group, 5.72% in support group* | | |
| | | |
| **Diabetes support group** | | |
| In non-support group | 75 | 50.0 |
| In support group | 75 | 50.0 |

**The effect of support group participation on glycaemic control of diabetes patients**

The results of glycaemic control cross tabulation with socio-demographic characteristics of respondents are shown in Table 2. Those with good HbA1c level were mostly participants aged 40-49 years, 25 (62.5%) and those aged 50-59 years, 33 (61.1%), while those with poor level of HbA1c were mostly participants of extreme ages in the study population who were those aged 30-39 years, 7 (46.7%) and 60-71 years, 28 (68.3%). Furthermore, male, 40 (59.7%), were found to have controlled glycaemic levels compared to their female counterparts, 39 (47.0%). In line with this, female, 44 (53%), had poor glycaemic control levels compared to their male counterparts, 27 (40.3%). Divorced participants, and those still married, were 6 (100.0%), and 68 (52.3%), respectively, and demonstrated good glycaemic control level (< 7%), while those still single, 9 (64.3%) at the time of the study, had poor glycaemic control level (≥ 7%). Good glycaemic control level 6 (100.0%) and 38 (60.3%) was recorded among those with no formal education and those who had tertiary education respectively, compared to those with secondary education, 28 (62.2%) who had poor glycaemic control level.

TABLE 2
Association of HbA1c with sociodemographic characteristics of participants

| **Characteristics** | **HbA1c (%)** | | **$\chi^2$** | **df** | **p-value** |
|---|---|---|---|---|---|
| | **< 7%** | **≥ 7%** | | | |
| **Age (in years)** | | | 10.324 | 3 | 0.016* |
| 30-39 | 8 (53.3) | 7 (46.7) | | | |
| 40-49 | 25 (62.5) | 15 (37.5) | | | |
| 50-59 | 33 (61.1) | 21 (38.9) | | | |
| 60-71 | 13 (31.7) | 28 (68.3) | | | |
| **Sex** | | | 2.404 | 1 | 0.121 |
| Male | 40 (59.7) | 27 (40.3) | | | |
| Female | 39 (47.0) | 44 (53.0) | | | |
| **Marital status** | | | 7.013 | 2 | 0.030* |
| Single | 5 (35.7) | 9 (64.3) | | | |
| Married | 68 (52.3) | 62 (47.7) | | | |
| Divorced | 6 (100.0) | 0 (0.0) | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Educational status** | | | 10.976 | 3 | 0.012* |
| No formal education | 6 (100.0) | 0 (0.0) | | | |
| Primary | 18 (50.0) | 18 (50.0) | | | |
| Secondary | 17 (37.8) | 28 (62.2) | | | |
| Tertiary | 38 (60.3) | 25 (39.7) | | | |

Table 3 presents the study findings on diabetes support group participation on glycaemic control of type 2 diabetes patients which showed that participants in non-support group had high level of uncontrolled HbA1c level (≥ 7%), 71 (94.7%) with a mean HbA1c level of 9.1%, while 75 (100%) in support group had controlled HbA1c level (< 7%) with a mean HbA1c level of 5.7%.

TABLE 3

Diabetes support group with HbA1c cross-tabulation

| **Group status** | **HbA1c** | |
|---|---|---|
| | Controlled level (< 7%) (%) | Uncontrolled level (≥ 7%) (%) |
| In non-support group | 4 (5.3%) | 71 (94.7%) |
| In a support group | 75 (100.0%) | 0 (0.0%) |

Findings on perceived dietary adherence are shown in Table 4 and reveal that participants in the non-support group had more non-dietary adherence, 65 (86.7%), and those in the support group reported high perceived dietary adherence, 57 (76.0%)

TABLE 4

Diabetes support group with perceived dietary adherence cross-tabulation

| **Group status** | **Perceived Dietary Adherence** | |
|---|---|---|
| | Dietary adherence | Non-dietary adherence |
| In non-support group | 10 (13.3%) | 65 (86.7%) |
| In support group | 57 (76.0%) | 18 (24.0%) |

The results presented on Morisky medication adherence in Table 5 revealed that participants in the support group have very high medication adherence, 45 (60.0%), those not in the support group experience low medication adherence, 62 (82.7%) to moderate adherence of 12 (16.0%)

TABLE 5

Diabetes support group with Morisky Medication Adherence crosstabulation

| **Group status** | **Morisky Medication Adherence** | | |
|---|---|---|---|
| | High adherence | Moderate adherence | Low adherence |
| In non-support group | 1 (1.3%) | 12(16.0%) | 62(82.7%) |
| In support group | 45(60.0%) | 7 (9.3%) | 23(30.7%) |

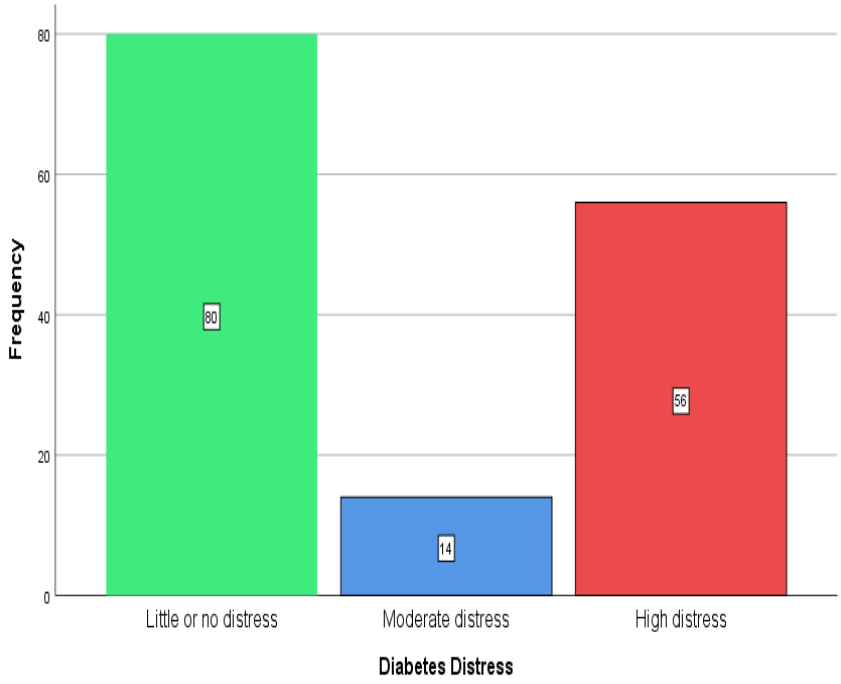



FIG. 1: Diabetes distress level of participants

Results presented in the bar chart in Figure 1 show the DDS of participants. Most participants had little or no diabetes distress, 80 (53.4%), while the remaining participants had varying levels of diabetes distress, ranging from moderate distress level, 14 (9.3%), to high level of diabetes distress, 56 (37.3%), in the study population.

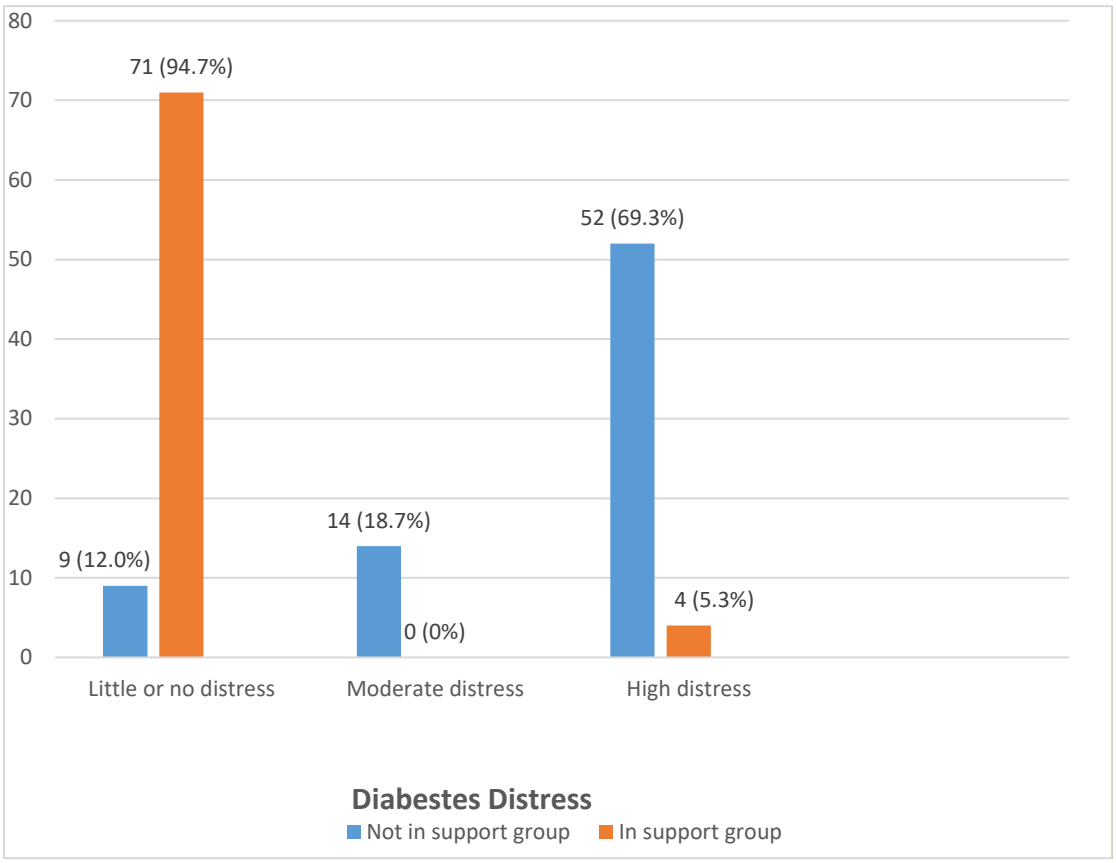



FIG. 2: Diabetes distress level of groups.

In Figure 2, most participants in support group, 71 (94.7%) demonstrated little or no distress as compared to participants in non-support group with varying diabetes distress ranging from moderate, 14 (18.7%) to high distress, 52 (69.3%).

Table 6 shows results regarding the subscales of diabetes distress on emotional burden, which revealed that those not in diabetes support group had more of moderate level of diabetes distress, 13 (17.3%) to high level of diabetes distress, 49 (65.3%), while little or no diabetes distress, 71 (94.7%) was reported among those in diabetes support group.

TABLE 6

Diabetes support group with diabetes distress subscale (Emotional burden) cross-tabulation

| Group status | Emotional Burden | | |
|---|---|---|---|
| | Little or no distress | Moderate distress | High distress |
| In a non-support group | 13(17.3%) | 13(17.3%) | 49(65.3%) |
| In a support group | 71(94.7%) | 0 (0.0%) | 4 (5.3%) |

In Table 7, Participants who reported that they experienced regimen distress of a moderate degree, 13 (17.3%), to high distress, 48 (64.0%) were mostly those not in any diabetes support group, while those in a diabetes support group had little or no distress, 68 (90.7%) arising from diabetes regimen distress.

TABLE 7

Diabetes support group with diabetes distress subscale (Regimen distress) cross-tabulation

| Group status | Regimen distress | | |
|---|---|---|---|
| | Little or no distress | Moderate distress | High distress |
| In a non-support group | 14(18.7%) | 13(17.3%) | 48(64.0%) |
| In a support group | 68(90.7%) | 3 (4.0%) | 4 (5.3%) |

Table 8 shows diabetes distress arising from interpersonal distress, participants not in any diabetes support group accounted for about 13 (17.3%) moderate distress level to 44 (58.7%) high distress level, while those who accounted for little or no interpersonal distress, 71 (94.7%), were mostly those in the diabetes support group.

TABLE 8

Diabetes support group with diabetes distress subscale (Interpersonal distress) cross-tabulation

| **Diabetes support group** | **Interpersonal distress** | | |
|---|---|---|---|
| | Little or no distress | Moderate distress | High distress |
| In a non-support group | 18(24.0%) | 13(17.3%) | 44(58.7%) |
| In a support group | 71(94.7%) | 0 (0%) | 4 (5.3%) |

Table 9 shows the physician distress effect. Those not in a diabetes support group reported more moderate diabetes distress 14 (18.7%) to high diabetes

distress 52 (69.3%), the reverse was reported among those in a diabetes support group, as they had little or no diabetes distress 68 (90.7%).

TABLE 9

Diabetes support group with diabetes distress subscale (Physician distress) cross-tabulation

| **Group status** | **Physician distress** | | |
|---|---|---|---|
| | Little/no distress | Moderate distress | High distress |
| In a non-support group | 9 (12.0%) | 14(18.7%) | 52(69.3%) |
| In a support group | 68 (90.7%) | 3 (4.0%) | 4 (5.3%) |

The effect of support group participation on revisits by diabetes patients in the last 6-months is shown in Table 10. There were more hospital revisits by the participants in the support group than in the non-support group in the long run. However, 48(68.6%) of participants in the non-support group made more revisits at 2-3 times and higher than the support group participants initially, who had 22(31.4%) participants revisiting. As the number of hospital revisits increased, those in the support group tended to visit the facility more than those in the non-support group, 4-5 revisits, 37 (67.3%) against 18 (32.7%), and for ≥ 6 revisits, 16 (64.0%) against 9 (36.0) respectively.

| Number of Hospital revisits | Diabetes support group | |
|---|---|---|
| | In non-support group (%) | In support group (%) |
| 2-3 revisits | 48 (68.6%) | 22 (31.4%) |
| 4-5 revisits | 18 (32.7%) | 37 (67.3%) |
| ≥ 6 revisits | 9 (36.0%) | 16 (64.0%) |

TABLE 10

Number of hospital revisits in the last six months with diabetes support group cross-tabulation

Table 11 shows various activities performed among participants in support groups. All the participants in the support group, 75 (100.0%) reported participating in all the activities that are offered.

TABLE 11

Activities carried out in diabetics support group

| Characteristics | Frequency (n = 75) | Percentage (%) |
|---|---|---|
| **Psychosocial support** | | |
| Emotional issue support | 75 | 100.0 |
| Mutual encouragement | 75 | 100.0 |
| Attending group session | 75 | 100.0 |
| A source of motivation/ inspiration | 75 | 100.0 |
| Strengthening diabetes self-care | 75 | 100.0 |
| Release of diabetes-related distress | 75 | 100.0 |
| Medication adherence support | 75 | 100.0 |

| | | |
|---|---|---|
| **Information support** | | |
| Access to healthcare | 75 | 100.0 |
| Shared knowledge | 75 | 100.0 |
| Seek timely medical support | 75 | 100.0 |
| Improving coping skills | 75 | 100.0 |
| Awareness campaigns | 75 | 100.0 |
| Improve quality of life | 75 | 100.0 |
| Diabetes education programme | 75 | 100.0 |
| | | |
| **Practical assistance** | | |
| Share experiences | 75 | 100.0 |
| Nutrition classes | 75 | 100.0 |
| Fitness classes | 75 | 100.0 |
| Financial assistance | 23 | 30.6 |
| Advocacy on diabetes policies | 53 | 70.6 |
| Clinic attendance | 75 | 100.0 |
| Blood glucose monitoring | 75 | 100.0 |

**Hypotheses testing**

Ho1: There is no statistically significant relationship between support group participation and glycemic control of diabetic patients attending healthcare institutions in Cross River State.

Table 12 shows the association of support group participation and glycaemic control of diabetic patients attending healthcare institutions tested with chi squared test statistics at a 0.05 level of significance. Result revealed that support group participation was statistically significant ($\chi^2$ = 134.810, df=1, p=<0.000).

TABLE 12

Association of HbA1c level with diabetes support group of participants

| | **HbA1c (%)** | | **$\chi^2$** | **df** | **p-value** |
|---|---|---|---|---|---|
| **Group status** | **< 7%** | **≥ 7%** | | | |
| In a non-support group | 4 (5.3) | 71 (94.7) | 134.810 | 1 | <0.000* |
| In a support group | 75 (100.0) | 0 (0.0) | | | |

Ho2: There is no statistically significant relationship between support group participation and adherence to therapy by diabetic patients attending healthcare institutions in Cross River State.

Table 13 shows the association of support group participation and adherence to therapy by diabetic patients attending healthcare institutions at a 0.05 level of significance. Result showed that support group participation was statistically significant ($\chi^2$ = 61.297, df = 2, p <0.000).

TABLE 13

Association of HbA1c level with Morisky Medication Adherence

| | **Morisky Medication Adherence (%)** | | | **$\chi^2$** | **df** | **p-value** |
|---|---|---|---|---|---|---|
| **Group status** | **High adherence** | **Moderate adherence** | **Low adherence** | | | |
| In non-support group | 1 (1.3) | 12 (16.0) | 62 (82.7) | 61,297 | 2 | <0.000* |
| In support group | 45 (60.0) | 7 (9.3) | 23 (30.7) | | | |

Ho3: There is no statistically significant relationship between socio-demographic characteristics (age, sex, marital status, and educational level) of diabetic patients and glycemic control.

A chi-squared test statistic was used to test the association of glycemic control with socio-demographic characteristics of diabetic patients attending healthcare institutions at a 0.05 level of significance, as shown in Table 2. Results showed that age ($\chi^2$ = 10.324, df=3 p=<0.016), marital status ($\chi^2$ = 7.013, df = 2, p <0.030), and educational attainment ($\chi^2$ = 10.976, df=3 p=<0.012), were statistically significant except sex ($\chi^2$ = 2.404, df = 1, p = 0.121) which was not statistically significant with glycaemic control.

## Discussion

### Socio-demographic characteristics of participants

This study which assessed the effect of support groups on health outcomes of diabetics accessing health facilities in Cross River State, Nigeria, was found to

have adult participants who were aged 30-76 years, the majority of whom were within 50-59 years. This was consistent with findings of Emeka et al. (2022), where the patients' mean age was 56.9 years, with the predominant age group of 50-59 years(17). This could be explained by the fact that, at this age bracket, there is eagerness to seek solutions to health problems and a high tendency to subscribe to health programs. (18, 19). More than half of the study population was women, aligning with other studies, which had more women than men (17, 20). This trend could be inferred to suggest that females are more prone to health-seeking behaviour than males, who often would tolerate their problems to demonstrate maschoism. Those who were married made up more than two-thirds of the study participants. This was similar to other studies in which the majority of participants were married(21, 22). This could be explained by the fact that most people get married in this age bracket. It was also observed in this study that most participants had a tertiary education, which aligns with the findings of Azar et al. (2024), who reported 38.2% of participants with a diploma and higher educational attainment(11). Our study showed that more than half of the participants had good glycaemic control, indicated by an HbA1c level of < 7%. This observation was in line with a study in Nigeria, where up to 94 (87.9%) of participants had good glycemic control(17). In the current study, age, marital status, and educational attainment were statistically significantly associated with good glycaemic control. The observation, however, was at variance with that of Sanchez-Hernandez et al. (2020), in which younger age, rural residence, smoking, time since diagnosis, and polypharmacy were associated with poor glycaemic control(23). It may have been anchored on self-discipline and control, although not assessed.

**The effect of support group participation on glycaemic control of diabetes patients**

This study found that participants in support groups had good HbA1c levels (< 7%), with a mean of 5.72%, compared with those in non-support groups, who had poor HbA1c levels (≥ 7%), with a mean of 9.14%. This corroborated studies of Werner et al. and Sabagh et al. (2024), which reported that peer group support resulted in a reduction in HbA1c levels, implying good glycaemic control(24, 25). Our study also supports earlier studies that reported a positive

influence of peer support group participation on HbA1c and glycaemic control(24, 26-29). The findings reflect the positive effect of support group activities in imparting knowledge and maintaining discipline in self-management strategies that usher in good outcomes.

**The effect of support group participation on adherence to therapy (diet and medication) of diabetes patients**

Findings on perceived dietary adherence revealed that those in the support group had high perceived dietary adherence, while those in the non-support group had more non-dietary adherence. This compares with the study of Saleh et al. (2022), which reported that about 85.6% of participants were taking the medication regularly and 78.8% followed dietary advice(30). This suggests a positive effect of support group activities.

Morisky's medication adherence tool revealed that participants in support groups in this study have very high medication adherence, while those not in support groups experience low to moderate medication adherence. The finding was in line with those of Huang et al. (2021) in T2DM patients, where medication adherence was higher (63.1%) than in non-medication adherence, 36.9%(10). The reason for this positive effect of medication adherence of participants in support groups may not be unconnected with the duration of participation in the peer support group activities, as reported by Rahayu et al. (2021), where it was observed that the duration in peer support groups is a vital predictor for medication adherence(31). They revealed that people living with diabetes and on medication for up to 5 years indicated significantly higher medication adherence. They further reported a significant relationship between illness duration and medication adherence in diabetes peer support groups(31). The finding also corroborates reports of other studies that documented low medication non-adherence of 24% among participants in support groups(32) and 24.5% in non-support groups(3).

In the present study, participants mostly in the support group had little or no diabetes distress as compared to participants in the non-support group, who had a high prevalence of diabetes distress (DD) (69.3%). This finding was consistent with the study, which reported moderate to severe DD of 51.9% (DDS-17)(33).

**Subscale of diabetes distress of participants**

Results presented on the subscales of diabetes distress (emotional burden) were observed to have a high level of diabetes distress (65.3%) in the non-support group relative to those in support groups who had lower diabetes distress on emotional burden. This finding compares with previous studies in which emotional distress and other diabetes-related distresses were high (33-35). However, unlike the other studies without group distinction, the present study was conducted among PLWD who participated in peer support groups and those who did not.

The distress subscales were also observed to have recorded high diabetes-related distress on regimen, interpersonal, and physicians' activities among non-support group participants than their support group counterparts. This finding aligned with that of Onyenekwe et al. (2020), in which there was also high diabetes-related distress bordering on regimen and physicians' activities of participants(33).

Based on findings on hospital revisits by diabetes patients in the last six months, those not in the support group made fewer hospital visits as compared to those in the support group. As the number of hospital revisits increased, those in the support group tended to revisit the facility more than those not in the support group. This finding agrees with an older study that reported the majority of diabetics visited health facilities monthly, albeit in a heterogeneous diabetic population study(36). The findings of this study also corroborated those of Opara et al. (2020), who reported 49.0% hospital revisits among participants(3). High transportation, late commencement of services, and unpleasant attitude of staff were factors associated with the few Hospital revisits.

**The activities carried out by the diabetes support group in the study population**

Regarding the activities carried out in the support groups by the study population, all participants reported that psychosocial, information, and practical assistance were provided. This aligns with the study that reported social determinants of diabetes self-management as the main activities of peer group support(8).

## Conclusion

The study found that members of diabetes support groups had better glycaemic control (HbA1c < 7%), more hospital revisits, and less diabetic-related disstress, than those in non-support groups. Being in diabetes support groups enhances adherence to therapy, sustained newly learned behaviour that promotes diabetes self-management thereby reducing diabetes-related distress, ensuring regular hospital visits for medical checkups. It also intensifies diabetes support group activities and bonding among members. This study has provided significant insights to the enormous benefits of the role of support groups, and should be encouraged especially in rural Cross River, where the challenge of funding and accessibility to health facilities is high. It revealed that existing social networks can enhance positive diabetes self-management outcomes.

**Recommendations**

Diabetes support groups, as a means of non-pharmacological therapy, should be encouraged in the management of diabetes as their activities improve glycaemic levels, knowledge, and raise diabetes self-care skills, particularly for patients without literacy skills. Future interventional studies may be needed to focus on uptake and utilization strategies of support groups among PLWD in remote communities.

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Authors' Contributions:

1. Anthony Agbajor Anyam, Eyam Sunday Eyam – conceptualization, study design, manuscript drafting, literature review, and final manuscript editing
2. Ekpereonne Babatunde Esu, and Lilian Eberechukwu Eyam – Methodology development, statistical analysis and data interpretation, critical review and editing of the manuscript.
3. Joseph Ajah Efut, Eucheria Abua - Assisted in empirical review of literature and laboratory analysis.
4. Immaculate Yochi Egeonu, Ekpenyonganwan A. Obo, John J. Etim - Community engagement, Data collection, and participants recruitment.
5. Opunyo Samuel Deigh - Assisted in data collection, data entry, and cleaning.
6. Osuchukwu NC – Study supervision and overview of the entire manuscript.

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Declarations.

**Data availability**

Upon request, data for this study which is safely guarded by the corresponding author, shall be made available.

**Ethical approval**

In line with the research ethics and policy of the State, Ethical approval was sought and obtained from the Cross River State Ministry of Health, with approval certificate number: CRS/MH/HREC/2024/VOL.2/036

**Accordance statement**

This study was conducted in accordance with the Helsinki's declaration and with the ethical standards of Cross River State Health Research Ethics Committee.

**Consent to participate**

Informed consent to participate, both verbal and written, was freely given before recruitment into the study. Confidentiality was assured, and participants were at liberty to withdraw at any time in the study without consequences.

**Consent to publish**

Not applicable

**Clinical trial number**: Not applicable