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RESEARCH ARTICLE

ASSESSMENT OF SICKLE CELL DISEASE AMONG UNDERGRADUATES OF TERTIARY INSTITUTIONS IN KADUNA STATE, NIGERIA

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The aim of this study is to examine the effects of SCD among students in tertiary institutions of Kaduna State. First, a retrospective analysis of all admissions at the tertiary institutions over a 5-year period (2017-2021) was conducted to identify students with SCD. The student's record was obtained from either academic record office or medical record office in the institutions for recording of students with SCD. The study recruited participants from six tertiary institutions with a sample size of 384. To complement the questionnaire, two Focus Group Discussions (FGDs) were held at both the State and federal institutions. Data were analyse with R programming language. The findings of this study revealed that out of the 385 participants, 258 (67%) were male, while 127 (33%) were female. Majority (88%) of the respondents are between the ages of 21-30 years and majority (88%) of the SCD patients frequently experience crisis every 3 months. About 65% of the SCD patients reported missing academic activities between 7 to 10 days in a month. And about 36% of the SCD patients used massage as a means of coping strategy to manage the crisis. The general trend of SCD patient among the undergraduate in tertiary institution of Kaduna state from 2016-2021 is on the reduction stage. Many of the undergraduate SCD patients depend on parent income in the school. Undergraduates of tertiary institutions with sickle cell disease (SCD) are at risk of underperforming academically as they miss classes and lectures due to rate of crisis occurrence. Many tertiary institutions in Kaduna state do not have data on SCD. It is therefore urgent to establish a data base on SCD and health related issues. It was also found that the academic performance of undergraduate students with SCD was negatively affected, and that they reported missing more days due to the frequency of crisis experienced. Special attention and SCD facilities should be made available in all the health care institutions to tackle the needs of SCD patients among the undergraduate students.

Keywords: Assessment, undergraduate, sickle cell, disease, Kaduna State

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INTRODUCTION

Having sickle cell disease (SCD) alone does not affect learning ability, but the complications of the disease may cause learning difficulties. Students may require extra help and encouragement when illness interferes with school. Fatigue due to anemia and sleep disturbances may be present. SCD affects over 30,000 students in the United States (Aygun, and Odame, 2012). Central nervous system complications are widespread among students with SCD and include stroke, silent cerebral infarction, and cognitive impairment. The effects of these complications may lead to academic failure, limited career options, and for some, total disability. In addition to the increased risk to academic difficulties due to absences from school, academic progress is further hindered by the neurocognitive complications that can accompany SCD (Kirksey, 2019). Because sickle cells can clump together in the brain, adolescents with SCD are at risk for cerebral vascular infarcts, or strokes, which may result in neurocognitive morbidity (Quinn et al, 2013).

Moreover, sickle-related complications have been shown to contribute to school absenteeism, school impairment, problems meeting school demands, and low participation in school activities with direct effects on academic performance and school success (Alhazmi, 2022). Although Nigeria has one of the fastest growing SCD populations globally, there is paucity of data on the effects of SCD on students, particularly of tertiary institutions, which are likely to suffer most from the physical and psychological burdens of the disease. At this educational stage, students are exposed to higher academic demands while having to cope with symptoms, build self-management and assume care responsibility of themselves as they transition from childhood to adulthood. In the past, SCD was thought to be a disease of childhood because many died early in life from SCD-related complications. Advancement in SCD treatment have altered its course such that many children are living into adulthood and probably obtaining diplomas and degrees in the tertiary institutions (Quinn, Rogers, McCavit, & Buchanan, 2010).

The Sickle Cell Disease Burden Interview (SCDBI) is a structured questionnaire to assess the psychosocial burden of disease. It was initially validated by Ohaeri and Shokunbi, (2002) as an instrument to assess the burden of SCD and was found to be relevant to Nigerian culture. It was used to assess the psychosocial burden of SCD on the family and caregivers of SCD sufferers; it assessed three main objective psychosocial domains, namely, the financial burden of the disease, the disruption of family interactions, and the disruption of routine family activities, as well as some subjective psychosocial burdens pertaining to the caregiver's feelings towards the patients and the ability of the family to cope with the disease. Furthermore, a similar study was conducted by Adegoke and Kuteyi, (2012) to assess the psychosocial burden of SCD on caregivers in a Nigerian setting using a structured questionnaire and a validated, culture-relevant disease burden interview. Results from these studies revealed that caregivers of SCD sufferers are faced with enormous financial, interpersonal, and psychological problems.

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Few studies have investigated the impact of SCD on the school-age population in Nigeria, while little or no data is available on the incidence burden of SCD among students of tertiary institutions in Kaduna State. Nigeria is one of the fastest growing SCD populations globally with paucity of data on the effects of SCD especially in Kaduna State. The tertiary institutions in Kaduna State have a good representation of Nigeria's youth population that is of great importance for this study in the tertiary institutions. During the reconnaissance survey, only six (6) tertiary institutions had information on SCDs and such information was either contained in school record in the academic office or school clinics. The aim of this study is to examine the effects of SCD among students in six tertiary institutions in Kaduna State over a 5-year period. This will be achieved by:

i analyze demographic and socio-economic determinants of health among SCD students.

ii describe the trends in SCD among students.

iii examine the burden of SCD on students.

iv examine the quality of available healthcare services for SCD management in the tertiary institutions.

METHODOLOGY

The study recruited participants, who study or have pursued studies at one of the following six tertiary institutions across Kaduna State, namely: 3 state tertiary institutions: i) Kaduna State University, Kaduna, ii) Nuhu Bamalli Polytechnic, Zaria, and iii) Kaduna State College of Education Gidan Waya, Kafanchan and 3 federal institutions: (i) Ahmadu Bello University, Zaria, ii) Kaduna Polytechnic, Kaduna, and iii) Federal College of Education, Zaria. The selection of these six institutions is based on a reconnaissance survey. Based on secondary data in 2022, there were 434 SCD patients in tertiary institutions of Kaduna State. About 385 sample size was calculated for the study and SCD patients were systematically selected. The data type includes all registered undergraduate students with SCDs (aged above 20 years, duration in school, nature of sponsorship, coping strategies, among others. The primary data were obtained through the administration of a questionnaire. The questionnaire collected information on the demographic characteristics of SCD patients, the educational and physiological burdens of SCD, and academic activities in the tertiary institutions, among many others. To complement the questionnaire, two Focus Group Discussions (FGDs) were held at both the State and federal institutions after gaining the school's permission to use a particular venue. The FGD session was made up of 6-12 patients comprising both male and female students. The FGD sessions were conducted as roundtable discussions and SCD patients were allowed to express themselves freely for 45 minutes. The discussions were guided by the principal investigator as to find out the participants' views on questions about

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the SCD burden, on their academic performance. A confidentiality agreement was put in place. Secondary sources of data were obtained for various SCDs related journals, published and unpublished books, and articles.

A systematic random sampling technique was used to select patients by phone or e-mail address found in secondary records. The procedure involves selecting SCD patients in a regular sequence from an initial randomly determined starting point. Potential participants were fully informed about the project and if they agree to participate, were asked to sign a written informed consent and to complete a semi-structured questionnaire survey in person. The questionnaire was administered via phone or in person by the research assistants in a venue approved by the school authority. All materials were in English. Trained research assistants assisted the principal investigator in collecting the data. A data quality control was conducted by the principal investigator throughout the data collection process in order to maximize completeness of data. Data were further examined for completeness and where appropriate were used in the analysis. Data were summarized in frequency tables and statistical hypothesis testing was performed using the R programming language

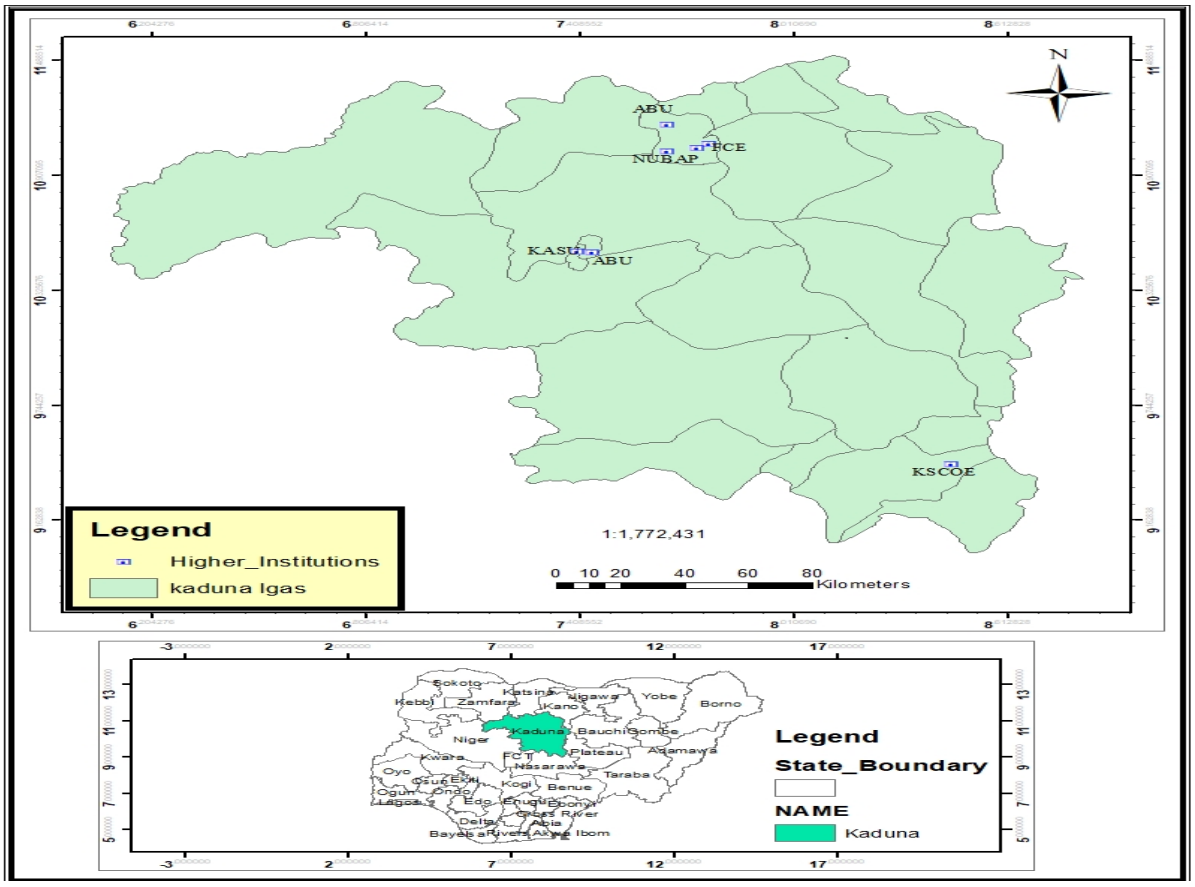

Figure 1: The Study Area
Source: Adapted and Modified from Ministry of land and survey Kaduna

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PRESENTATION OF RESULTS AND DISCUSSION

The result was a retrospective study of all admitted undergraduates in the tertiary institution in Kaduna State over five academic years, 2017 – 2021. The total number of undergraduate students who responded was 385. Of the 385 undergraduate students, 258 (67 percent) were male and 127 (33 percent) were female. This is to be expected because both religion and culture within the geographical location places priority to the education of males compared to their female counterparts. And again, the male students were more interested to partake in the study than the female since the individuals in this study were allowed to participate willingly. This result is contrary to that of Hassan, Abid, and Ahmed, (2019). Age is also an important variable in the study which shows majority (88 percent) of the respondents are between the ages of 20-30 years. This is also in agreement with the work of Olagunju, Faremi and Olaifa, 2017).

The dominant class of respondents of highest duration of study was year 4 and the least was year 1. Majority (88 percent) of the SCD patients frequently experience crisis every 3 months followed by 5.7 percent who experience a crisis every six months with most usually occurring in the month of April to June (87 percent). April to June is usually dusty and happens to be the onset of the rainy season in the northern part of Nigeria that breeds mosquito infestation on the high side. Thus, these conditions have the potential to trigger SCD crisis leading to absenteeism in the school. Tewari et al., (2015) posed that, a range of sickle cell disease severity is associated with exposures to diverse environmental factors including low temperature, rainfall, wind and air pollutants among other climate related phenomena in any geographical location.

Further, 65 percent of the SCD patients reported missing academic activities between 7 to 10 days whenever they felt sick while 11 percent and 24 percent reported missing fewer than 3 days and more than 4-6 days, respectively. The SCD patients among the undergraduate in tertiary institutions have had low performance in the academic activities due to the length of days of sicknesses. About 36 percent of the SCD patients used massage as a means of coping strategy to manage the crisis while 14 percent did not pursue any pain relief strategies (see Table 1). One of the students shared his experience during the focus group discussions in one of the sessions as *"Whenever I'm in pain, my roommate will use hot water with aboniki to rub my body (massage), I will take paracetamol or Panadol extra, then doze off; sometimes, I wake up and the pain is gone, at times, I wake up, still in pain*,".

Another respondent also shared her experience *"I am always embarrassed at my situation because the crisis does occur unexpectantly whereby I will be unconscious and when it happens I always get myself admitted in the hospital"*. These experiences show that a good number of SCD patients missed a lot of academic activities at any time which in turn affects their academic performance.

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Table 1: Distribution of SCD Patients According to Sex, Age, Study Duration, Frequency of Crisis, Months of Crisis, Duration of Crisis and Crisis Management

Variable	Frequency (N = 385[1])	Percentage (%)
Sex		
Male	258	67
Female	127	33
Age		
16-20	29	7.5
21-25	266	69
26-30	75	19
31-35	13	3.4
>36	2	0.5
Study Duration		
1	17	4.4
2	74	19
3	99	26
4	140	36
5	55	14
Frequency of Crisis		
Every 3 months	337	88
Every 6 months	22	5.7
Every 9 months	6	1.6
Every 12 months	12	3.1
Above 12 months	8	2.1
Months of Crisis		
January-March	27	7.0
April-June	336	87
July-September	22	5.7
October-December	0	0.0
Duration of Crisis		
1-3	42	11
4-6	92	24
7-10	251	65
Crisis Management		
Analgesic/Other Medication	108	28
Massage	140	36
Call SCD Specialist/Medical Officer	67	17
None	52	14
Visit GP	18	4.7

Source: Field Survey, 2023

Figure 2 shows 5 year period of graphical representation of undergraduate students with SCD. There is a steady fluctuation of admissions with the least in 2019/20 as most of the institutions like A.B.U Zaria could not admit students due to Covid-19 pandemic. This is not the actual number of SCD students as many tertiary institutions in the state do not have

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proper record of SCD or related disease in health care (sick bay) or computer base system. The result shows that general trend of SCD patient among the undergraduate in tertiary institution of Kaduna state from 2016-2021 is on the decrease. The decrease in SCD patients could either be attributable to either reduction in admission processes or increase of awareness and education of SCD in the state and Nigeria at large.

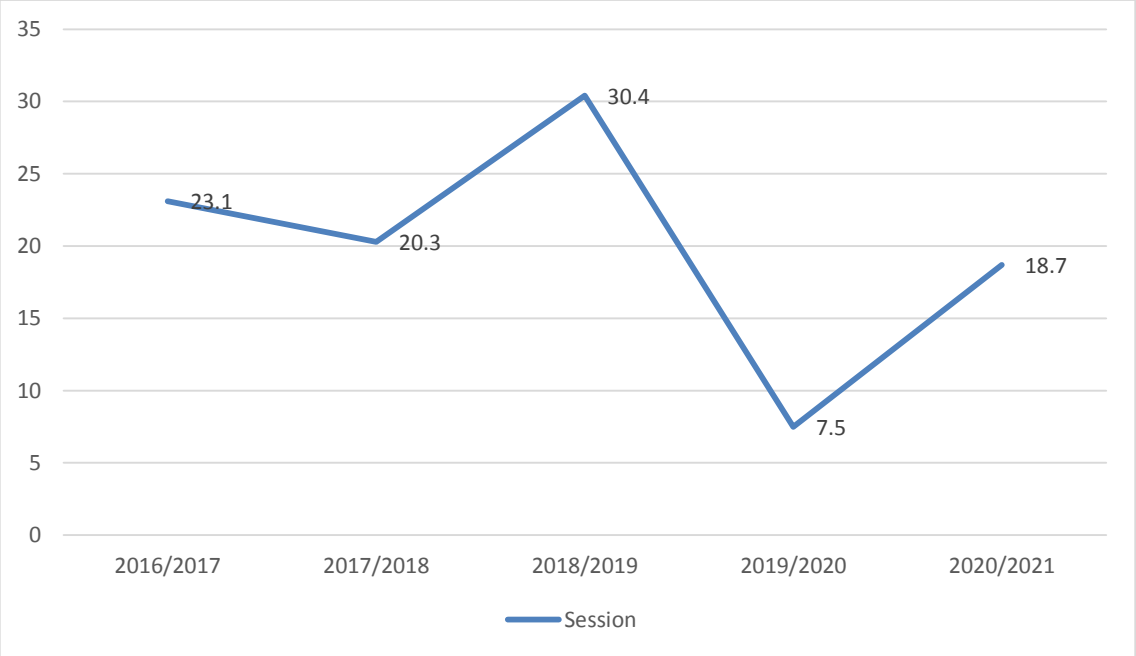

Figure 2: Trend analysis of SCD patients (2017-2021)
Source: Field Survey (2023).

Comparison SCD patients and Age, Sex and years at the university SCD patients

The comparison between age, sex and year spent in the university show that majority of male SCD patients are affected by the number of days absent from school compared to their female counterpart which agrees with previous studies from outside Nigeria (Crosby, Joffe, and Irwin, 2015). This is to be expected as the nature of the culture and geographical area tends to favor men over women. The age group (20-30 years) of both male and female seems to suffer over a long stay in school for a four-year course (see figure 3). This is due to the effect of SCD that hinders the completion of a four-year course as require

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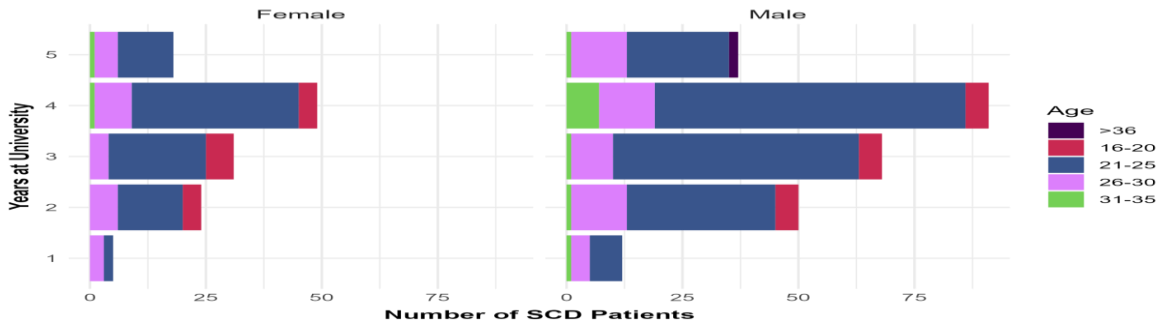

Figure 3: SCD Patients by Age, Sex, and Years at the University
Source: Field Survey (2023).

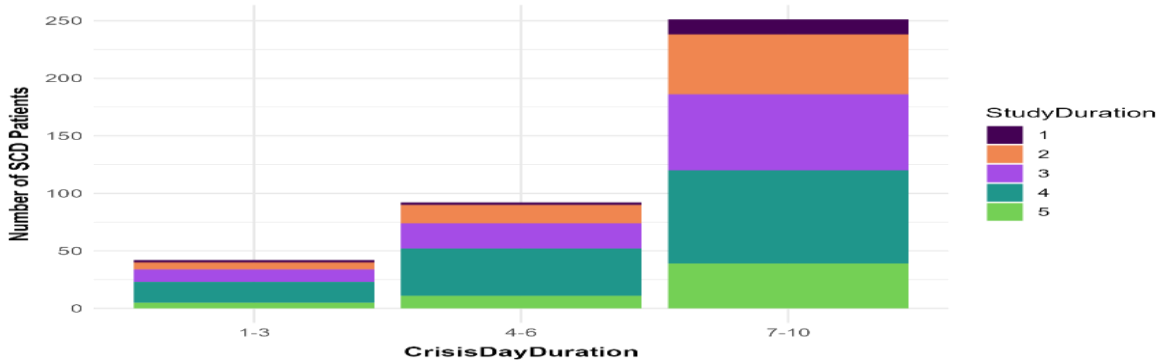

Figure 4: SCD Patients by duration of Crisis and Study duration
Source: Field Survey (2023).

Education is a transformative asset and generally fertilizes the mind to bear good fruits; yet, specialization at tertiary institution level trims the mind for specific skills to perform better in the future of SCD Patients. The result in figure 4 shows the relationship between duration of crisis and study duration. The length of crisis duration (7-10 days) affected a greater number of SCD patients in year four. Crisis duration cause students to have difficulties in attaining lectures, missed test, assignments or examinations.

Sudden crisis and excruciating pains by SCD patients' leads to a long absenteeism as shown in Figure 3 is expected to have more harmful consequences in terms of academic achievements when they are not in school. At times, students who miss lectures might also receive less support to catch up with missed lessons, test, and examination and are asked to either repeat a class or have a carry over as seen in Table 1. This is what Pijl et al. (2021) observed that sickness absence does not only affect student's academic achievement due to missed lessons and instruction time, but also because sickness absence might for many students be related to (mental) health conditions with a negative impact on student's academic and psycho-social development.

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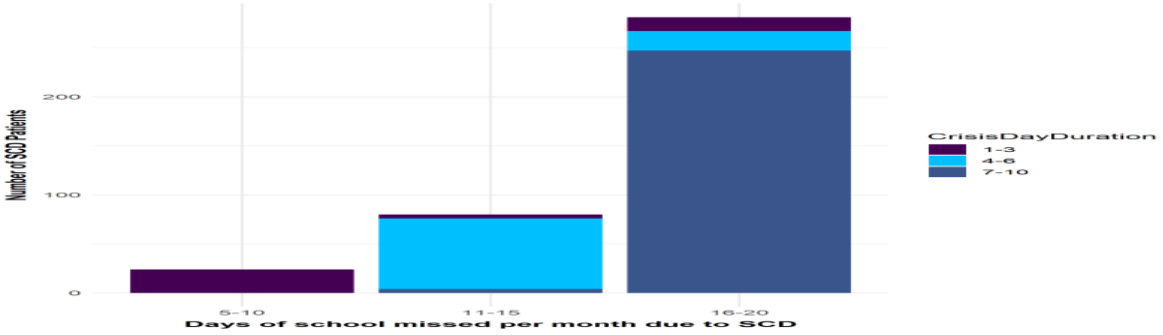

Source: Field Survey, 2023

Undergraduates of tertiary institutions with sickle cell disease (SCD) are at risk for poor academic performance and these academic difficulties have a substantial effect on quality of life and potential for their future. The rate of crisis frequency appears to have a significant effect when comparing respondents with school absenteeism and this may due to the excruciating pain associated with SCD (see Table 2). This is in concordance with the work of Al-Saqladi (2016) which found a correlation between SCD severity and the academic performance of the affected students in Yemen. The rate of absenteeism directly affects the requirement for attending at least 75 percent of a class to be allowed to take the exam. SCD patients are at the receiving if their attendance score did not make the require percentage. Hassan, Abid, and Ahmed, (2019) also reported the same findings that students with SCD recorded lower performance compared to their classmates that are not affected by SCD in Iraq.

On the contrary, Ogunfowora, et al, (2005) discovered that there is no association between school absenteeism and academic performance of students with SCD although study uses a small sample size of 52 students with SCD. It is believed that the larger sample size used in the study elaborated the association between school absenteeism and academic performance for students with SCD. The SCD have significantly affected their academic performance as shown in the results with high rate of absenteeism. The lower school performance is usually associated with absenteeism among students with SCD that lead to either having carry over or repeat class.

This is supported with the work of Adegbola (2011) which revealed that 31 percent of the SCD patients repeated a semester, 13 percent repeated 2 or more semesters and 111 patients out of the 244 studied had one or more courses to repeat. This further supported with the work of Olagunju, Faremi and Olaifa (2017) which revealed that 67.2 percent of SCD patients were of the opinion that SCD contributed to their poor academic performance whereby 31.1 percent and 12.7 percent have 1 or at least a session respectively due to excruciating pain of SCD. When the SCD patients were asked whether they have ever missed test or examination due to SCD, almost all of the respondents reported to have missed test and examination on account of SCD.

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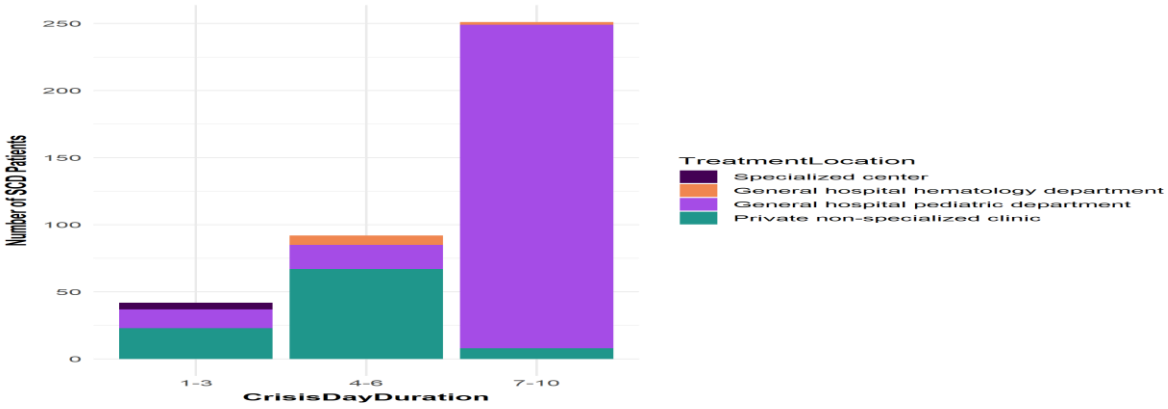

The SCD patients are faced with the problem of school management not having concern of their situation which translate to poor management of SCD in the institution. The result in figure 4 shows that students with SCD visit other health facilities outside the school for treatment. And to further ascertain whether the school authority is aware of their situation.

All the respondents claimed that the stake holders are not aware of their situation that is why they are not given any special attention. One of the respondents stated thus:

"*even if you are sick and you go to sick bay (school clinic) you will only be given Panadol and most at times there is no doctor in the clinic"*. Another respondent also states that *"if I am sick I always go home so that my parent can adequately take care of me on time"*.

Due to the shared challenges and experiences by SCD patients, Epping, Myrvik, Newby, Panepinto and Brandow (2013) and Crossby et al, 2015, revealed the findings that elucidate the challenges that SCD patients among the undergraduates in tertiary institutions encounter and necessitate the need of school authority to have concerned and take these challenges into consideration, since they add another burden that could negatively affect the quality of life of students.

CONCLUSION

In this study, many tertiary institutions in Kaduna state do not have data on SCD. It is therefore urgent to establish a data base on SCD and health related issues. It was also found that the academic performance of undergraduate students with SCD was negatively affected, and that they reported missing more days due to the frequency of crisis experienced. Special attention and SCD facilities should be made available in all the health care institutions to tackle the needs of SCD patients among the undergraduate students.

Competing Interest

The authors have declared that no conflicting interest exist in this manuscript.

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