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ASSESSMENT OF KNOWLEDGE ON SICKLE CELL ANAEMIA AMONG PRIMARY HEALTH CARE WORKERS IN ZARIA CITY, KADUNA STATE, NIGERIA.

Bayero, A; Abubakar,I; Balarabe R; Gommaa H; Uthman R

ABSTRACT:

This study assesses the knowledge on sickle cell anemia among Primary Health Care workers in Zaria City of Kaduna State, Nigeria. A cross sectional descriptive study design and mixed approach was used for this study. Multi-stage sampling technique was employed to select 369 study participants. The instrument used for this study include self-developed structured questionnaire to obtain information on participant's knowledge concerning epidemiology, signs and symptoms, management/control, complications and current screening services for sickle cell disease patients, and a structured interview guide is also used to determine respondents' awareness on centres where services for these patients could be obtained; from 14 participants. Data was analysed using frequencies, percentages and one way and over statistical analysis was used to test hypotheses. Findings revealed that the knowledge concerning sickle cell disease was poor. Knowledge concerning epidemiology was good. Knowledge concerning clinical manifestation and complication was poor and knowledge concerning management and control including current screening services of SCD was poor. The result of the structured interview revealed that the respondents were aware of sickle cell disease, knowledgeable about the available centres providing care for SCD patients but have poor knowledge about screening services available and have no idea about the bed capacity of the centre providing services to SCD. They also have no idea of the type of categories of professionals dealing with SCD.

The first hypothesis in this study revealed that there is a statistically significance between the profession and level of knowledge and the

second hypothesis showed that there is no significance difference between professional status and knowledge regarding SCD. In conclusion, knowledge gaps related to different aspects of sickle cell disease and differences in the level of knowledge among professionals are identified. It is recommended that continuing education for all primary health care workers should be organized to enable them provide qualified services to these patients.

Keywords: Sickle cell anaemia; knowledge; primary health workers.

INTRODUCTION

Background

Sickle cell anaemia, commonly referred to as sickle cell disease (SCD) is one of the leading causes of morbidity and mortality, with over one million people dying worldwide every year [Aygün, 2012]. The term encompasses a group of genetic haematologic conditions where pathology occurs due to the inheritance of the sickle cell gene 'S' either homozygously (AS), or as a double heterozygote 'SS', or with another interacting gene (SC or S β +thal) (Sergeant, 2013). It is more prevalent in the sub-Saharan regions like Africa, India and Arabian Gulf. Globally, more than 300 000 children are born with the disease (HbSS), and it is predicted also that by the year 2050, about 400 000 babies shall be born with the condition (Noubouossie, et al., 2016; Yaqoob, & Hussain, 2015). In the African scene, over 100 million people are afflicted, with Nigeria having 24% (over 4 million) of her population being afflicted. The prevalence of the disease is found to be highest in the 0-5

year's age group, but with the high mortality in the same age group, these results in the 21-25 year age group prevalence below (Shamsuddeen, et al. 2007)

The significance of malaria and the carrier state (HbAS) is discovered in Zimbabwe by British colonial Doctors in 1940. By 1954 the hypothesis of 'sickle cell disease offering partial immunity for malaria' is confirmed based on evidence that malaria and sickle cell disease share the same geographic distribution Bloom, 1995; 25-28, Biljana et al. 2007; 6-7 & WHO, 2015). Sickle cell disease has enormous public health implications, as it is often complicated by the unpredictable but frequent episodes of aches and pains that are associated with the disease. The severity of symptoms varies between individuals, and gauging illness severity is based mainly on the frequency of bone pain episodes (among others) because it is the most common sequelae and a major source of morbidity, affecting either the legs, knees, arms, lower back, chest or abdomen. Pain can be dull, sharp, throbbing, or unpredictable. Bone pain attacks are recurrent thus responsible for almost 90% of hospital admissions. It often resolves by the 5th or 7th day following the administration of simple analgesics. (WHO, 2015, Bayero, M6: U3). Bone pain crises increase in adolescence most especially in males but its severity and frequency declines after 25–30 years. Triggering factors of the bone pain crisis are; high hemoglobin level, low fetal hemoglobin, infections, Malaria, exposure to cold temperatures, and stress. Furthermore, if infection superimposes on these avascular tissues, premature fusion and a permanent shortening of the affected bone ensues. [Sergeant, 2014; Xavier Gomes, L. M., et al., 2011] (Bayero, M6: U3).

Sickle cell disease reduces the quality of life for millions of affected cases by causing frequent hospitalizations, morbidity and mortality thus impacting on personal and national health expenditures. (CDC, 2016; Bayero, 2016; M7:U1). Also, the economic,

psychological and social implication for these individuals including family members (out-of-pocket spending for health care) is enormous. This is as a result of the recurrent crises and hospitalizations which interfere with their lives, living with the fear of identification and stigmatization, disrupting educational or work routines, and impairing both physical and psychosocial development. [WHO, 2016]. However, the introduction of the pneumococcal vaccine in 2000 results in a reduction of mortality in the 0-5 year's age group between 1999 and 2002 by 42% in the US. [CDC, 2016] In Nigeria, the vaccine is introduced in 2014. [Muhammad, 2015], but no data is found for its effect on reducing mortality rates in SCD cases. The economic cost of medical expenditure exerts too much strain on health facilities with estimates from USA reaching approximately \$475 million between 1989 through 1993. In Nigeria, average health expenditure for an individual for 1 year is between ₦5,000 (US\$30) and ₦185,000 (US\$1,121) which often is another source of poverty for low and middle-class family. [Oladele, et al. 2015].

Management of sickle cell disease begins with proper diagnosis. Screening of blood samples in the laboratory for diagnosis of SCD entails “phenotypic” testing for the presence of the sickle haemoglobin (HbS) as well as genotypic analysis. Furthermore, the presence of HbS in a blood sample is identified using the 'sickling test' with sodium metabisulphite in the majority of settings due to its affordability. [Noubouossie, 2016; Chakravorty & Williams, 2015] The disadvantage of the sickling test is that it can only diagnose children of 6 months and above. (Noubouossie, 2016) However, confirmatory test is carried out where applicable using the haemoglobin electrophoresis at varying pH (alkaline and acid), isoelectric focalization (IEF), capillary electrophoresis, high-performance liquid chromatography (HPLC)

and molecular techniques. (Noubouossie, 2016) (Bayero, 2016; M6: FP; Part 1).

Traditionally, management of SCD symptoms is carried out with non-specific measures such as maintaining adequate nutrition, having enough rest, regular intake of copious fluids, avoidance of cold temperatures by wearing warm clothing and adherence to routine prescribed medications. In addition, the daily routine administration of folic acid and paludrine during stable periods, and penicillin therapy as routine prophylaxis are the strategies used to address the incidence of anaemia and malaria. [Chaturvedi, & DeBaun, 2015; Nnodu, 2014] Active management includes blood transfusion, intravenous rehydration therapy, and managing complications. (Noubouossie, 2016) (Bayero, 2016; M6: FP; Part 1).

Furthermore, studies have discovered “emerging therapies and promising new insights” [American Society of Haematology, (ASH); 2015] in the management of SCD such as new born screening, hydroxyurea therapy, and stem cell transplant. Hydroxyurea is said to provide alternative care to intermittent transfusions in the prevention of stroke, and stem cell transplantation is said to cure the individual of the disease (ASH, 2015). Consequently, most cases now live longer than before; from 14 years in 1970 to 40 years and above now (National Heart Lung and Blood Institute (NHLBI), 2012). Furthermore, the new treatment with hydroxyurea has been documented to reduce the incidence of bone pain crises, therefore minimizing the number of hospital visits/admission. (NHLBI, 2012 & ASH, 2015) (Bayero, 2016; M7: U1).

The global standard of care for these patients varies due to treatment disparities globally, (American society of haematology, 2015) more so in Nigeria, available evidence suggest that care of affected persons is largely sub-optimal (Galadanci, et al. 2013).

Management of SCD is affected by the lack of proper national health policies and programs that shall regulate the type of preventive and symptomatic care for cases living with the disease. In Nigeria; these policies exist, but they do not cover national territories. (Noubouossie, 2016 & Frédéric et al., 2013) Finally, inequalities in the accessibility to benefits of modern SCD care by poor and rural populace exists where many cases that could benefit from significant therapy are denied erroneously. [NHLBI, 2012] Hence this study on Sickle cell anemia: Knowledge among Primary Health Care workers in Zaria City of Kaduna state, Nigeria.

STATEMENT OF THE PROBLEM:

Adewoyin, (2015) posits that part of the clinical practice of most general duty health professionals in Nigeria is care of sickle cell disease patients. But because there are virtually no specialist centers, or where they are, services are not dedicated to them, (no daycare settings) it makes keeping abreast with current knowledge and interventions rendered to SCD patients difficult for these professionals.

Sickle cell disease (SCD) is the most important hemoglobinopathy worldwide and is associated with high morbidity and mortality [WHO, 2016; WHO, 2015 & Sergeant, 2013] Sickle cell disease patients represent a high-risk group, most especially at the age of 5 years and below. This condition manifests with frequent episodes of aches and pains, recurrent infections, and frequent hospitalization. Some are living with the fear of identification and stigmatization, educational or work routines are disrupted and most importantly, it impairs on both physical and psychosocial development [WHO, 2016]. All these affect the duration and quality of their lives. [ASH, 2016] knowledgeable/ skilled manpower and necessary equipment's are necessary for rendering quality. (Bayero, 2016; M7: U2)

The patients often report to health care centers during crises to be attended to by Health care workers. Most often in Kaduna State of Nigeria, the Health care workers are Doctors, Nurses, Midwives, Public Health Nurses (PHN) Community Health officers (CHO), the community Health Extension Workers (CHEW) and the Health assistants. These personnel are sometimes at a loss of what to do, due to inadequate knowledge of the disease and of the variety of current management regimen available for this special group of people. This knowledge gap negatively affects the quality of services rendered, thereby leading to avoidable complications and even death. [Xavier Gomes, L. M., et al., 2011] (Bayero, 2016; M7: U2). Therefore, this study is conceived to assess primary health care workers knowledge concerning the aetiology, manifestations, current screening, management and preventive measures of sickle cell anaemia, including where services are rendered.

OBJECTIVES:

- i. To determine the level of knowledge regarding aetiology and manifestations of sickle cell disease among primary health care workers in Zaria city of Kaduna state, Nigeria.
- ii. To assess the level of knowledge regarding current screening, prevention, and management of sickle cell anaemia among primary health care workers in Zaria city of Kaduna state, Nigeria.
- iii. To identify the level of knowledge concerning available facilities rendering Sickle cell anaemia intervention services in Kaduna State, Nigeria.

RESEARCH QUESTIONS:

- i. What is the level of knowledge regarding aetiology and manifestations

of sickle cell disease among primary health care workers in Zaria city of Kaduna state, Nigeria?

- ii. What is the level of knowledge regarding current screening, prevention, and management of sickle cell anaemia among primary health care workers in Zaria city of Kaduna state, Nigeria?
- iii. What is the level of knowledge concerning available facilities rendering Sickle cell anaemia intervention services in Kaduna State, Nigeria?

SIGNIFICANCE OF THE STUDY:

Findings of this study will provide information on knowledge of aetiology, manifestations, current screening, prevention, management and available facilities rendering Sickle cell anaemia intervention services among primary health care workers in Zaria City of Kaduna State, Nigeria. This information will be relevant to the healthcare workers, curriculum designers, policy makers, non-governmental organizations and scientific community. The curriculum and policy makers can use the knowledge gap to design an appropriate blue print that will address the identified short fall, while the employers and NGOs will implement these new changes through organizing seminars, conferences, and workshops based on new trends in the management of sickle cell anaemia. Furthermore, employers can design strategies for health workers to go for in-service training at designated periods. Finally, the scientific community will use the findings as a basis for further studies on factors influencing knowledge of health care workers.

SCOPE OF THE STUDY:

This study is limited to all primary health care workers knowledge on aetiology, manifestations,

current screening, prevention, management and available facilities rendering Sick cell anaemia intervention services, employed in Zaria city primary health care facilities of Kaduna state, Nigeria.

Strengths and Limitations:

There are limitations encountered during sourcing for information and knowledge on current preventive and control measures has to be included to get enough information. Articles on knowledge of SCD alone are limited.

RESEARCH METHOD

Research design and approach: The research method is the mixed approach; using the cross-sectional descriptive method.

Description of the sample population: The sample for this study was drawn from all health professionals currently employed by the state ministry of health, who are rendering health care services

Inclusion and exclusion criteria: The inclusion criteria for this study include; employment by Kaduna state government, working in PHC in Zaria city, and being a member of the following occupational groups: Doctor, Nurse, Midwife, PHN, CHO, CHEW, JCEW and Health assistant. The exclusion criteria for this study include; being on leave, those who are still undergoing training, those who have not undergone formal training from institutions previously outlined and TBA.

Characteristics of selected sample:

The selected study populations are the staff of the selected primary health care centres who are adults, 18-55 years old, either male/female, married/single, mostly married with children. Most are natives (Hausa/ Fulani) and of the Islamic faith.

Study size determination: The study size was determined by taking into cognizance the type of study to be conducted and nature of the population, which was estimated at 1000 and above. A margin of error was set at +/- 5%, confidence interval of 95% and a standard deviation of .5. In addition, the standard z-score for 95% confidence interval was obtained as 1.96 [Smith, 2013, WHO, 2001; Pp.76]. Thus according to Smith, (2013) & WHO, (2001); Pp.76, the formula used to derive sample size for this study was:

$$N = (z\text{-score}) \times SD \times (1 - SD) / (\text{margin of error})$$

The sample size was then calculated as:

$$N = ((1.96) \times .5 (1 - .5)) / (.05)$$

$$N = (3.8416 \times .25) / (.0025)$$

$$N = .9604 / .0025$$

N = 384.16. Therefore, the sample size makes up to **385** participants. [Smith, 2013, WHO, 2001; Pp.76]

Sampling method: The sampling method employed for this study is the multistage sampling technique. In the first stage, the population is clustered into LGAs. Secondly, two (2) Local Government Areas are selected using simple random sampling. Thereafter, the selected Local Government Areas are also clustered into PHC centers. A representative sample is then selected from the PHCs representing 50% of the PHCs using systematic sampling technique. Finally, for small PHC centers, all available health workers are included in the study, while for the larger PHC centers, proportionate allocation is employed to sample the desired sample size using simple random sampling technique. Summary of the sampling technique is presented in table 1 below.

Table 1: Sample Frame:

STAGE	ACTIVITY
Stage 1	Clustering into 4 local government areas (Zaria, Sabon gari, Giwa and Kudan)
Stage 2	Selection of 2 local government areas; Simple random sampling shall be employed
Stage 3	Obtaining a list of all Primary Health Centers (PHC) in the 2 selected Local Government areas in the primary sampling units. Systematic random selection of 50% of PHCs
Stage 4	Selection of the desired number of respondents in accordance with the sample size from the above selected PHC's

The number of responses for this study is estimated at 90 to 100% because the researcher distributed and retrieved the questionnaire personally. Where applicable, the researcher waits and collected instruments immediately to minimize loss of instruments. In comparison to articles reviewed, response rate varied between 45% (Xavier Gomes, 2015; McWalter, 2011), and 100% (Adeyemi, 2007; Isa, 2016 & Yaqoob, 2015), with the average being 56%.

Instrument: The instrument used for this study include Questionnaires and Interviews. The questionnaire were divided into sections, representing assessment on epidemiology, manifestations and complication, management, control and screening of sickle cell disease.

The interview is used to corroborate the response from the questionnaire.

Closed - ended and open-ended questions are designed to gather desired information based on the objectives of the study.

Data Collection: The researcher conducts all structured interviews and distributed all questionnaires. Tape recorders are used to record the structured interview (Bayero, 2016. M7: U5). Selected respondents fill in Questionnaires and answer interview questions to assess their knowledge.

Participants are met at their various PHCs while on duty, where the unit head is approached and the introduction letter (duly signed by the respective Heads of Health) presented, and their consent sought and documented. Those on evening duty are approached at their shift duty period, while those on night shift are scheduled for when they resume morning duty, and those off duty are scheduled for when they resume duty. Data collection was done over a period of 4 weeks. The researcher distributed all questionnaires and conducted all interviews. Respondents were also briefed on the significance of the study, and all questions arising while filling in instruments were answered.

Data analysis

Table 2: Data set and analysis method:

SNo	Set of Data	Analysis type
1	Data on demographic information of respondents	Descriptive
2	Scores on knowledge of epidemiology of SCD	Descriptive
3	Scores on knowledge of clinical manifestations of SCD	Descriptive
4	Scores on knowledge of management of SCD	Descriptive
5	SCD clients	Descriptive

Descriptive statistical analysis was used to describe the basic features of the data collected on respondents' demography and their awareness of available centers rendering services to SCD clients during this study, with the aim of simply summarizing the samples and the measures gathered. The Mean scores are also used for analysis. The knowledge test performance on epidemiology, clinical manifestations and management of SCD were measured using the mean of scores.

A statistical method for the analysis of demographic data (section A) was the mean. The data was measured at nominal levels, thereby meeting the requirements for the statistical tests [Fields, 2013]. Data on Knowledge of epidemiology (section B), clinical manifestations and management (section C & D) of SCD among PHC workers was analyzed using frequency and percentage. They were chosen because the researcher is interested in the overall level of knowledge and not specific item analysis.

In addition, the data on awareness of available centers rendering SCD services was assessed using interview, which shall be documented quantitatively using frequency. The data shall be analyzed as quantitative [Fields, 2013]. The interview shall be used to corroborate the response from the questionnaire and also for clarifying any misconceptions [Green, & Thorogood, 2014].

Level of health care facility (Tertiary, secondary, primary) as a confounding factors was controlled by sampling respondents who are working in primary health care facilities only within the same senatorial zone of Kaduna State. Other confounders include; age, sex, years after graduation and length of service in PHC. They were controlled by including them in the study.

Tests for Hypotheses:

The data on Knowledge of epidemiology, clinical manifestations and management of SCD were scored manually. The maximum score to be attained is 37 points. A score of 19 and above shall be considered substantial.

In line with the objectives of the study, the data on knowledge levels (Sections B, C & D) shall be analyzed using frequency and percentage [Kothari & Garg 2014]. Statistical analysis is one-tailed.

The null hypothesis to be tested is that: Professional status of the PHC worker has no effect on their knowledge regarding SCD

The alternative hypothesis to be tested is that: Professional status of the PHC worker has an effect on knowledge regarding SCD

To test these hypotheses, a one-way ANOVA statistical analysis will be used.

RESULTS:

Response rate:

Three hundred and eighty-five (385) questionnaires were distributed to primary health care workers in Zaria and Sabon Gari LGAs of Kaduna state, Nigeria. A total of three hundred and sixty-nine (369), (representing 95% response rate) were retrieved. In addition, a total of 14 respondents were interviewed.

Knowledge regarding SCD:

Table 3 assess the primary health care workers knowledge on SCD, the respondents were presented with 37 item questionnaires, covering epidemiology, clinical manifestations, complications, management, control and

screening services. The responses were evaluated and scored. Their responses were marked based on the marking scheme. Each response was allocated a point, making a maximum of 37 points obtainable. Scores and percentages related to performance of professionals in the test of their knowledge about sickle cell disease were presented as seen in table 3. It can be seen from table that majority of the respondents are clustered around scores 4-18. The mean score of the respondents is 14.0, and the standard deviation (SD) is 5.9. The modal frequency is within score 13-15. It can be deduced from the data that their knowledge on SCD is below average. Also, with a SD of 5.9, it can be inferred that they are not very different in their knowledge.

Table 3: Knowledge regarding SCD

Scores	Frequency	Percentage
0-3	0	0
4-6	41	11.1%
7-9	50	13.5%
10-12	63	17.1%
13-15	88	23.8%
16-18	42	11.4%
19-21	34	9.2%
22-24	32	8.7%
25-27	10	2.7%
28-30	9	2.4%
30 & above	0	0
Total	369	100%
Mean= 14.0		SD= 5.9

Table 3b determine the level of knowledge regarding SCD, their responses were scored and categorized into 'poor' & 'good'. Scores ranging from 19-37 were regarded as good, while 0-18 scores were regarded as poor. A summary of the results is presented in table 4.2 below.

It can be inferred from table 3b that only 27% have good knowledge regarding SCD, while the majority (63%) of the respondents had poor knowledge concerning SCD.

Table 3b Knowledge concerning SCD:

Level of knowledge	Frequency	Percentage
Good	100	27%
Poor	269	63%
Total	369	100

Table 4: Knowledge concerning Epidemiology of SCD:

Four items on the questionnaire were used to assess the respondents Knowledge concerning epidemiology of SCD. With 4 points being the maximum and 0 point being the minimum, their responses were scored and the results are summarized.

From the table, it can be seen that majority (57.7%) of the respondents demonstrate good knowledge concerning epidemiology of SCD. However, 42% have poor knowledge. These findings suggest that more than half of the respondents are knowledgeable on the epidemiology of SCD. To further reveal their performance, item analysis of their responses was made and presented.

Table 4: Knowledge concerning epidemiology:

Level of knowledge	Frequency	Percentage
Good	213	57.7%
Poor	156	42.3%
Total	369	100

Table 5: Knowledge of Clinical Manifestations and complications of SCD:

Two questions with 19 options were used to assess their knowledge of Clinical Manifestations and complications of SCD. Six out of the 19 questions are inappropriate responses with regards to the variable being assessed. The respondents are expected to recognize (by not selecting) the inappropriate responses. Each correct response attracts 1 point. With a maximum of 13 points and minimum of 0, the scores were graded. A score

of 7-13 is considered 'good' while a score of 0-6 is considered poor.

Summary of results on knowledge of Clinical Manifestations and complications of SCD is presented.

From table 5, it can be seen that only one-third (33.3%) of the respondents have good knowledge, while the remaining two-third (66.7%) of the respondents have poor knowledge regarding clinical manifestations and complications of SCD.

Table 5: Knowledge concerning Clinical Manifestations and complications of SCD

Level of knowledge	Frequency	Percentage
Good	123	33.3%
Poor	246	66.7%
Total	369	100

Table 6: Knowledge on Management, control and current screening services of SCD:

Nine questions were used to assess respondents Knowledge on Management, control and current screening services of SCD. Each correct response attracts a point. With 20 as the

maximum obtainable points, the scores were graded as good (11-20) and poor (0-10). A score

A summary of the results is presented below:

Data from table 6 shows that only 12.7% of the respondents had good knowledge, while majority (87.3%) had poor knowledge.

Table 6: Knowledge concerning Management, control and current screening services of SCD:

Level of knowledge	Frequency	Percentage
Good	47	12.7%
Poor	322	87.3%
Total	369	100

STRUCTURED INTERVIEW OF RESPONDENTS

(e): Awareness of available centers providing care for SCD patients: Structured Interview

To ascertain the respondents' awareness of available centers providing care for SCD patients, a total of 14 participants were interviewed. They were chosen because in addition to their roles in PHC, they were responsible for the initial assessment, diagnoses and planning of care for patients at their respective PHCs. Also, in the event of the need for referral, they are responsible for it. The interview process was audio recorded and three respondents agreed to be recorded on video. All the respondents answered the six questions. The findings were thematically analyzed and the results of the interview are presented below:

Q1: *To ascertain if respondents were aware of available centers providing care for SCD patients, they were asked “Are you aware of any centers that offer care to sickle cell disease patients?”*

Almost all (92.8%) of the respondents answer is “Yes” to the above question, with the exception of only one who answers “No”. She was a JCHEW (3).

Q2: *To confirm the veracity of responses to the above question, the respondents were then asked “Where is it located?”*

Half (50%) of the respondents are able to correctly identify “Ahmadu Bello University Teaching Hospital” located in Shika, Zaria, which actually offers such services. Three other participants correctly added another centre located in the state capital. Furthermore, one respondent in addition, correctly added the name of another facility and a subsidiary of the A.B.U teaching hospital located in Sabon Gari Local Government Area. However, 2 respondents are confirmed to be unaware of any centre at all; by wrongly mentioning their own PHC centre.

To clarify their awareness of available services provided by the centers, they are asked four questions (3, 4, 5 & 6).

Q3: *“What diagnostic equipment is available at the centre?”*

Majority (respondents: 1-3, 5-7, 9 -14), of the respondents confessed that they had no idea about the type or name of the diagnostic equipment used for SCD screening. This information denotes poor knowledge about screening services available at the centers. However, two others respondents responded by

stating that the centers “have many” (respondent 4), while respondent 8 stated that “They use machines” without specifying which type.

Q4: “*What is the available bed space at the centre?*”

More than half (52%) of the respondents (respondents: 1, 3, 6, 8, 10, 13, 11, 14) have no idea about the bed capacity of the centre providing services to SCD patients. Three respondents stated “*may be 10 beds*” (respondent 2), “*6-12*” beds (respondent 9)” and “it is a “*small hospital*” (respondent 7). However, further probe reveal that they are referring to their own PHC centers. Only two respondents are able to correctly state the bed capacity for centers providing services to SCD patients. One of the respondents (respondent 12) state that “*over 300*” beds in ABUTH Shika, Zaria. The remaining two respondents state “*150 or more*” (respondent 5), and “*above 100*” (respondent 4) implying to the centre in the state capital (Kaduna State University Teaching Hospital).

Q5: “*What are the categories of specialized medical personnel at the centre?*”

For this question, all the participants responded incorrectly. For instance, one respondent (respondent 11) stated that the centers have “*adequate personnel*”, two other respondents (respondent 4&5), said “*all categories of professionals*” are available and the remaining half of the respondents vaguely listed specialists', consultants and Nurses. However, respondents 1&3 confessed that they have no idea about the categories of personnel at the centers.

Q6: “*What types of services are offered to SCD patients?*” (Do they include, diagnostic services, treatments, management of complication, follow up, educational services?)

Majority of the respondents (respondents: 1, 4, 6, 8, 9, 12-14), agreed that diagnosis, screening and management are offered. Two other respondents (respondents: 10 & 11) vaguely answered that the “*type of care is depending on the patient's condition*”; while another (respondent 5) responded that services offered are “*preventive, curative, rehabilitative*” Three of the respondents (respondents: 2, 3 & 7) said they don't know.

Hypothesis Testing:

To test the null hypothesis for this study which states that, Professional status (Doctor, Nurse/midwife, Nurse, Midwife, PHN, CHO, CHEW, JCHEW and HA) of the PHC worker has no significant effect on their knowledge regarding SCD, which comprises; knowledge of epidemiology, clinical manifestation, complication, management, prevention/control, current screening services, as well as awareness of available health facilities. One way ANOVA was used.

This study attempted to find the level of knowledge concerning various aspects of SCD among primary health care workers of Kaduna state, Nigeria. The results were analysed with a 2 (level of knowledge) by 9 (profession) analysis of variance (ANOVA). Summary of the result is presented in table 8.

Table 8 shows the mean of the respondents. Overall, respondents tended not to be knowledgeable on the various aspects of SCD, with an overall mean of 14. For instance, the Doctors and PHN are the least knowledgeable with an aggregate mean of 10 and 9 respectively. However, the midwives proved to be more knowledgeable, with a mean of 22.

Table 7 **One-way ANOVA**

Profession	Mean Knowledge		
	Knowledgeable	Not knowledgeable	Mean
Doctor	-	10	10
Nurse/Midwife	5	15	15
Nurse	20	14	16
Midwife	25	12	21
PHN	-	9	9
CHO	23	12	15
CHEW	23	11	13
JCHEW	22	12	14
HA	23	10	12
Mean	23	11	14

To determine the source of variance among the health professionals working in the PHC's, a one-way ANOVA was also used. The results are presented as can be seen from table 8, a main effect of profession was observed. Respondents who belong to a certain profession tend to be more knowledgeable than the others. Consequently, it can be concluded that there is a statistically significant interaction between type of profession and level of knowledge. The main effect at 0.05

level of significance is; F (2.893) at 9 degree of freedom. The calculated F value is more than the critical value (1.98) at 9 and 359 degrees of freedom. Standardised critical value from one-way ANOVA probability table of 0.05 was obtained from; NIST/SEMATECH, (2017)

Based on the findings, the null hypothesis which states that “Professional status of the PHC worker has no effect on their knowledge regarding SCD” is hereby rejected.

Table 8 **One-way ANOVA**

	DF	Sum of Square	Mean Squares	F-ratio	P
Between groups	9	879.083	97.676	2.893	0.05
Within groups	359	12120.478	33.762		
Total	368	12999.561			

F-critical= 1.98

(f): Summary of key findings:

Major findings from this study are summarized as follows:

- Poor knowledge regarding SCD
- More than half of the respondents have good knowledge concerning epidemiology of SCD
- Two-third of the respondents have poor knowledge concerning clinical manifestations and complications of SCD
- Close to 90% of the respondents had poor knowledge concerning management, control and current screening services of SCD
- A little more than half of the respondents are aware of the available centres providing care for SCD patients.
- There is a statistically significant difference in SCD knowledge among different professionals working in the Public Health Centres.

DISCUSSION:

This study determines the knowledge of sickle cell anaemia among primary health workers in Zaria, Kaduna State. The results from this study have shown that primary health care workers have poor knowledge level concerning various aspects of sickle cell disease. The writers believed that the poor knowledge of the respondents reflect on the quality of health care that is rendered to patient under their care and Abdulraheem (2011) explained that quality health is a fundamental right of all Nigerian citizens. The writers felt that it is also disheartening to discover that despite all effort made by the Nigerian government to establish several PHCs in urban and rural areas, quality health care services still evade some chronically ill groups. This study is not concurrent with study of Carden, et al. (2016) who observed high knowledge among caregivers and they attributed the high rate of knowledge to visit of patients with SCD. This

study is at variance with the study of McWalter, et al. (2011) who reveal high knowledge among the respondents managing patients with SCD. Finally, Collins (2010) revealed high score obtained from health workers in Nigeria.

The findings from this study revealed that the respondents performance on “Epidemiology” is good (62.6%). The results of this section is consistent with the results obtained by Xavier, et al (2011), with a mean knowledge rate of 5.4. The writers observed that the knowledge about the epidemiology of a disease is very important because it enables an understanding of the distribution and determinants of health and disease processes in human populations. In particular, knowledge of sickle cell disease epidemiology would enable the health care professionals participating in this study to understand the magnitude of the disease in their region and alert them to factors associated with negative outcomes of the disease. Moreover, a thorough knowledge of disease epidemiology would enable the development of group or risk stratification for patients and families under their responsibility.

The result of this study shows that the respondents has poor knowledge on clinical manifestations and Complication section. This result is a little different from that of Xavier, et al. (2011) where varying knowledge rates of the clinical manifestations of SCD among their responded were recorded. Knowledge rates ranged between 23.0% - 100% with an average score of 66.6%. The writers perceived that Primary health care workers should have adequate knowledge of these clinical manifestations and complications of sickle cell disease, which Fernandes, et al. (2010) & Tanyi, (2003) explained that it represent an essential guide to the direct patient treatment. Our study is similar to the study conducted in Nigeria by Isa, et al (2016) on the awareness and acceptability of prenatal diagnosis of SCD,

reported that 65.7%, of the respondents, have not heard about prenatal diagnosis.

This study report that the respondent knowledge on management, control and current screening services of sickle cell disease patients is poor. The writers believed that the Primary health care workers should possess an adequate amount of knowledge regarding the medical and psychosocial aspects of sickle cell disease because Sergeant, (2014) explained that sickle cell disease, as a chronic condition, is usually accompanied with high degrees of suffering, most especially in children. This study is consistent with the result of a study conducted by Xavier, et al (2011) & Xavier, et al (2015) in Brazil where questions asked that scored below 75% included knowledge of the use of folic acid, prophylactic penicillin, pneumococcal vaccination, diagnostic tests and referrals to other related special clinics.

The results of interview from this study are not encouraging as poor knowledge rates are obtained for 5 questions. Only a little more than half of the respondents are aware of the available centers providing care for SCD patients. With reference to the question where are the centers located? It was surprising to discover that a staff that is trained in A.B.U.T.H. does not even mention it, but rather mentioned the centre in the state capital (8). Moreover, none of the respondents are able to concisely mention 'haematologists' or 'paediatricians' when asked the different categories of personnel working at the said centers. Finally, none of the respondents is able to mention the "day care centre" in A.B.U.T.H, available especially for SCD patients.

Results of hypotheses of this study revealed that there is a significant difference between knowledge level and professional grouping. This test has specified that the Nurse/Midwives professional group is more knowledgeable. This finding is similar to that of Adeyemi & Adekunle, (2006), which

revealed differences in the knowledge of complications of sickle cell disease in pregnancy. They further explained that the mean score observed among Doctors is 5.29, for the Nurses; 4.42, while other health workers had 3.66.

These findings are not unusual because the quality and duration of training for these professionals differs. For example, the doctors spend about 7 years of training both in the University and hospital (usually tertiary level) setting where they have more exposure on SCD. Also, some of the Nurses who are BNSc graduates also receive training in institutions similar to those of the Doctors. The other professionals usually receive their training in colleges of health and clinical experience in secondary and primary level facilities for duration between 1-3 years of training.

RECOMMENDATIONS FOR ACTION:

As stated earlier in this chapter, "Quality health is a fundamental right of all Nigerian citizens" [Abdulraheem, 2011], therefore, there is a need for highly skilled and experienced primary health care workers to care for all patients at the PHC level. It is also imperative to acknowledge and confirm the findings of this study in order to make appropriate changes to existing practice. All primary health care workers should be scheduled to attend conferences, workshops and seminars on sickle cell disease as often as possible.

IMPLICATIONS FOR PUBLIC HEALTH:

Findings from this study will be very relevant to the curriculum designers of health institutions, policy makers, non-governmental organizations and scientific community in general. The curriculum and policy makers can use the knowledge gap to design an appropriate blue print that will address the identified short fall (pre-service and in-service), while the

employers and NGOs will implement these new changes through organizing seminars, conferences, and workshops based on new trends in the management of sickle cell disease. Furthermore, employers can design strategies for health workers to go for in-service training at designated periods.

Furthermore, to build an effective network of health care, teams of Primary health care workers should be formulated among PHC centers, to discuss with other professionals from general and tertiary hospitals on modalities and the best way to care for their patients' living with sickle cell disease.

RECOMMENDATIONS FOR FURTHER STUDY:

Results from this study can be utilized as a basis for replication and further research on other health care workers knowledge concerning SCD in other LGAs of the state.

A confirmatory study of PHC workers knowledge concerning SCD from a different State in Nigeria can be conducted in order to gain more insight and to extend the findings.

Further studies, assessing the knowledge of primary healthcare workers before and after in-service training in the care of sickle cell disease patients would bridge the gap in the paucity of data on this topic.

CONCLUSION:

Knowledge rates' regarding SCD among respondents for this study was obtained, and findings reveal a mean knowledge of 14.0 and an SD of 5.9%. However, more than half of the respondents have good knowledge concerning the epidemiology of SCD but two-third of them have poor knowledge concerning clinical manifestations and complications of SCD. In addition, close to 90% of the respondents have poor knowledge concerning management, control and current screening services of SCD,

and only a little more than half of the respondents are aware of the available centers providing care for SCD patients.

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