Journal of Community Medicine and Primary Health Care. 35 (3) 15-26
https://dx.doi.org/10.4314/jcmphc.v35i3.2

JOURNAL OF COMMUNITY MEDICINE AND PRIMARY HEALTH CARE

ORIGINAL ARTICLE

Knowledge of Childhood Cancer Case Detection among Primary Health Care Workers in Osun State

Omobuwa O,[1] Akande RO,[2] Akinleye CA,[1] Olarewaju SO,[1] Faramade IO,[1] Opakunle O,[1] Adeyemo SC,[3] Asekun-Olarinmoye E,[1] Omisore G,[1] Ariyo OF,[4] Adeleke AA,[4] Ayansola KN.[4]

[1] Department of Community Medicine, Osun State University, Osogbo, Osun-State, Nigeria
[2] Department of Community Medicine, LAUTECH, Ogbomoso, Oyo-State, Nigeria
[3] Department of Public Health, Faculty of Basic Medical Sciences, Adeleke University, Ede, Osun-State, Nigeria
[4] Department of Public Health, Osun State University, Osogbo, Osun-State, Nigeria

Keywords:

Case Detection;

Knowledge;

Childhood Cancer;

Health Care Workers;

Primary Health Care

ABSTRACT

Background: Survival rates of childhood cancer in Nigeria is low because suspected cases of childhood cancer are usually diagnosed at an advanced stage. It is hoped that assessing the knowledge gaps in the identification of warning signs and symptoms of childhood cancer among healthcare workers in primary healthcare facilities would lead to an improvement in early diagnosis, detection, and referral, which will subsequently reduce mortality from childhood cancer.

Objective: To assess the knowledge of childhood cancer case detection among primary health care workers in Osun state.

Materials and Methods: A descriptive cross-sectional study was carried out among 210 primary health care workers recruited by multistage sampling technique. Data was collected using a pretested semi-structured questionnaire. Analysis was done using SPSS software version 23.0 and level of significance set at $p<0.05$.

Results: About 55.7% and 44.3% of the respondents had good and poor knowledge of childhood cancer respectively. There was a statistically significant association between respondents' knowledge, their marital status (p=0.00) and years of experience with case detection practices of childhood cancers (p=0.006). Married respondents were 6 times less likely to have poor knowledge (OR 0.398, 95% CI 0.213 - 0.745, p=0.004). Also, those with 6-10 years of experience were 7 times less likely to have poor knowledge (OR 0.349, 95% CI 0.13 - 0.939, p=0.037)

Conclusion: Respondents had good level of knowledge on detection of childhood cancer however, there is a need for continuous training to further build their capacities on detection of signs and symptoms of childhood cancers.

Correspondence to:
Akande Roseline Oluyemisi
Department of Community Medicine,
LAUTECH, Ogbomoso
Oyo-State, Nigeria.
roakande39@lautech.edu.ng

INTRODUCTION

Globally, an estimated 400,000 children are diagnosed with cancer yearly, with the majority living in low and middle-income countries where treatment is frequently inaccessible or

excessively expensive.[1] Approximately 70,000 and 29,000 of those children reside in Africa and within the Sub-Saharan Africa region respectively.[2,3] About 30% of these children can access treatment, in contrast with over 80% of those in high-income nations.[4] Childhood cancers comprise the scope of cancers found in children below the age of 19 years in all parts of the body including blood and lymph nodes, the central nervous system, the kidneys and different organs and tissues.[5] Although it is believed that various forms of cancers have different risk factors, the causative factors of most childhood malignancies are largely unknown.[6] Approximately 10% of all children with cancer have a predisposition because of genetic factors, some chronic infections, such as HIV, Epstein-Barr virus and malaria, hepatitis B virus are also identified risk factors for childhood cancers.[1] Most childhood cancers are amenable to treatment although the prognosis depends on the growth type, and the stage of the disease at the time of diagnosis.[7]

The burden of malignant diseases on Nigeria's health care system is not known because of inadequate data as there are no central cancer registries and where they exist, collation of data is suboptimal.[7] The most common paediatric cancers in Nigeria as documented by a previous study conducted in University College (UCH) Ibadan include; lymphomas (22·4%) out of which 90% were non-Hodgkin lymphomas, with Burkitt lymphoma constituting the majority of cases (73%). Other common neoplasms reported include retinoblastomas (21%), soft tissue sarcomas (14·9%), leukaemia's (10·2%) and CNS tumours (6·9%).[8] Patients with childhood cancers in Nigeria often present at specialist centres with advanced-stage disease. Hence it is not surprising that paediatric cancer survival rates in the country is reported as 30% compared with 80% in high-income countries.[4,9] The contributory factors implicated in delayed detection of paediatric cancers range from poor health-seeking behaviours of caregivers, poor access to care on account of unavailable finances, stigma, socio-cultural beliefs of parents, deficient diagnostic capability as well as poor training of health workers, and unavailability of specialist care amongst others.[4]

Primary health care (PHC) settings usually play a critical role in diagnosing childhood cancers, providing the first point of care for patients diagnosed with cancers in most countries.[10] The nature and type of PHC facility determine the number and type of human resources that may be required. In Nigeria for instance, the PHC facilities are classified into four main categories by the National Primary Health Care Development Agency (NPHCDA).[11,12] The first category (or health post) is manned by the Junior Community Health Extension Workers (JCHEWs), while in the second category of PHC facilities (or Basic Health Clinic), the staff complement includes two Community Health Extension Workers (CHEWs) and four JCHEWs.[11,12] In the third category of PHC facilities (Ward Health Centre) the staff complement comprises one medical officer if available, one Community Health Officer

(CHO), one Public Health Nurse (PHN), three CHEWs, four Nurse/Midwives and one medical Assistant. The fourth class of PHC facilities are the comprehensive health centres, which consist of a staff distribution of three doctors, one CHO, one PHN, three CHEWs, four Nurses/Midwives and one medical Assistant.[11,12] The PHC workers provide care closest to community members; they mobilize and empower communities for health actions, thus promoting equity and ensuring accessible health care.[4,13]

Childhood cancer is associated with a range of warning symptoms, such as fever, severe and persistent headaches, bone pain and weight loss that can be detected by trained primary health-care providers.[14] Furthermore, the involvement of healthcare workers at the primary health care (PHC) level in the early detection and prompt referral of children and adolescents with possible clinical features of cancer is an important strategy in the improvement of survival from paediatric cancers in Nigeria.[4] According to the World Health Organization (WHO), early diagnosis of childhood cancers often consists of 3 components, which include; awareness of symptoms by families and primary care providers; accurate and timely clinical evaluation, diagnosis, and staging (determining the extent to which a cancer has spread); and lastly access to prompt treatment.[1]

In children with red flag symptoms of malignancy, a complete history, including personal and family history, is fundamental.[15] Preliminary symptoms may have started abruptly (e.g., bone pain after minor trauma) or developed insidiously over a few weeks to several months (e.g., intermittent headaches). They may also be constitutional and non-specific such as fatigue, pallor, fever and anorexia or the symptoms may be localized in the form of a palpable mass.[15] Accurate diagnosis is essential for the treatment of children with cancer because each cancer requires different treatment modalities that may include surgery, radiotherapy, and chemotherapy.[1] The WHO launched a Global Initiative for Childhood Cancer in 2018, with the hope that this will translate into an additional one million lives saved or a survival rate of at least 60% for children with cancer. This initiative is to be achieved by the year 2030.[16] Despite the increasing burden of childhood cancers, targeted interventions including control programs, and the provision of early diagnosis and treatment services are limited in most African countries, including Nigeria.[17] Furthermore, there is a dearth of studies assessing the gaps in knowledge of healthcare workers in the case detection of childhood cancers, particularly in Primary healthcare centres.[10] Therefore, an assessment of the knowledge of primary health care workers on the detection of childhood cancers being the first contact of care, could serve as a basis for improving the chances of early diagnosis and survival rate of these patients.[18]

Hence, this study aimed to assess the level of knowledge of primary healthcare workers on childhood cancer case detection in Osun State.

Table 1: Socio-demographic Characteristics of the Health Care workers (n=210)

VARIABLE	FREQUENCY	PERCENTAGE (%)
AGE (years)		
20-39	158	75.2
40-59	52	24.8
Mean age (±SD) = 34.3 ± 8 years		
SEX		
Female	166	79.0
Male	44	21.0
MARITAL STATUS		
single	112	53.3
married	96	45.7
separated	2	1.0
CADRE/DESIGNATION		
Medical Doctor	2	1.0
Nurses	45	21.4
Health assistant	10	4.8
Community Health officers	18	8.6
Community Health Extension Workers	84	40.0
Others	51	24.3
YEARS OF EXPERIENCE		
1-5 years	146	69.5
6-10 years	30	14.3
>10years	34	16.2

MATERIALS AND METHODS

Study Area: Osun State is one of the Southwestern States in Nigeria and its capital is Osogbo. Osun is the ninth smallest state in area and nineteenth most populous state with an estimated population of about 4.7 million and a total area size of 14,875 square km.[19] Osun State is divided into three federal senatorial districts, each of which is comprised of two administrative zones. The state has thirty (30) local government areas (LGAs) and 332 primary health care centres distributed across all the LGAs in Osun state.[19] There are 3 Government-owned Colleges of Health Science and Technology in Osun State and 4 accredited private Colleges of Health Technology in Osun-state, training various cadres of health care workers required in the PHC settings.[20,21] These categories of workers include; Junior Community Health Extension Workers (JCHEWs) Community Health Extension Workers (CHEWs), Community Health Officers (CHO), laboratory, pharmacy and dental Technicians amongst others.[20,21]

Study Design and Population: This was a descriptive cross-sectional study with a population comprising healthcare workers in PHCs of Osun State.

Inclusion Criteria: Health workers who had spent at least one year actively working in the primary healthcare facility were recruited into the study.

Sample size Determination: The sample size was determined using Leslie Fischer's formula for population<10,000.[22] Using a prevalence of 44.1% (0.441) obtained from a previous study

(representing the proportion of respondents that could correctly identify the majority of signs and symptoms of childhood cancers).[23] With an acceptable margin of error of 5%, the calculated sample size was 200, but 210 was used based on the anticipated non-response rate of 5%.

Sampling Technique: Study participants were recruited using a multi-stage sampling technique.

Stage 1: Selection of 10 local government areas out of the 30 local government areas in Osun State by simple random sampling (balloting method).

In stage 2, the list of all registered PHCs in these local governments was obtained from the Osun State Primary Health Care Development Board, out of which 2 PHCs were selected from each of the 10 LGAs using a simple random sampling technique by balloting, making a total number of 20 PHCs.

In stage 3, systematic sampling was used to select study participants using proportional allocation to determine the number of health workers selected in each PHC (with the sampling interval determined based on the number of Health workers in the health facilities and the total number of respondents to be selected from each facility). The first respondent in each facility used was selected by simple random sampling through the balloting method and subsequent respondents (Kth respondent) were recruited by using the sampling interval obtained.

Proportional allocation of health workers was obtained using = $\frac{Xa}{NT} \times$ Sample size

Where Xa = Number of health workers in a particular health facility.

NT = Total number of health workers in each of the selected facilities

Sample size = 210

Method of data collection: Data was collected using a pretested semi-structured, self-administered questionnaire comprising two parts: the first part obtained information on the socio-demographic characteristics of the respondents and the second part assessed knowledge about childhood cancers.

Scoring of outcome Variables: In the questionnaire, questions on knowledge were scored 1 for the right answer and 0 for the wrong answers. The total and average scores were computed, and respondents with scores equal to and more than the mean score of 13.7 out of 35 were categorized as having good knowledge while others with a score less than the mean score were categorized as having poor knowledge.

Data Analysis: The collected data were entered into a computer and analysed using Statistical Product and Service Solutions (SPSS) version 23. Univariate analyses were done and presented using a frequency table, charts, and summary indices. The Chi-square test was utilized to analyse the relationship between the categorical variables which are socio-demographic characteristics and knowledge of childhood cancer case detection among primary healthcare workers in Osun State. Binary

logistic regression was utilized to predict the relationship between the independent (age, sex, cadre of staff and marital status) and outcome variables (knowledge of the health workers). The level of statistical significance was set at $p<0.05$.

Ethical Consideration: Ethical approval for the study was obtained from the Health Research Ethical Committee of Osun State University (UNIOSUNHREC2022/PBH006) and the Primary Health Care Development Agency (PHCDA). Permission was also obtained from the Medical Officer of Health, Community Health Officer (CHO) and Matrons in charge of the primary healthcare centres. The benefits of the study were duly explained to the study participants and they were assured of confidentiality. Informed consent was obtained from all participants, and they were identified using serial numbers.

RESULTS

A total of 210 healthcare workers participated in the study. The respondents' mean (SD) age was 34.3 (±8) years ranging from 20 to 59 years of age. Of these, 166 (79%) were females and 44 (21%) were males. The majority (40.0%) of the respondents were Community Health Extension Workers (CHEWs), with nurses, doctors and health assistants making up the rest of the respondents. Regarding the duration of work experience, most of the respondents 146 (69.5%) had between the range of 1-5 years of work experience, 30 (14.3%) had 6-10 years and 34 (16.2%) had greater than 10 years of work experience. **(Table 1)**

Most of the respondents 185(88.1%) were aware of childhood cancer, and about half 107, (51.0%) reported leukaemia as the most common childhood cancer, while only 3 (1.4%) selected rhabdomyosarcoma as the most common childhood cancer. The presence of lumps and masses was reported as a well-known symptom of childhood cancers by more than half of the respondents 126, (60.0%). About two-thirds of the respondents, 144, (68.6%), had not seen suspected cases of childhood cancers while 97, (46.2%) said they could effectively refer the suspected cases of childhood cancers and 113, (53.8%) could not effectively refer suspected cases of childhood cancers. After scoring, more than half (55.7%) of the respondents had good knowledge while 44.3% had poor knowledge about childhood cancers. **(Table 2)**

In the bivariate analysis, there was a significant association between the marital status of the respondents and the knowledge about childhood cancers with 43.8% of those who were single, having good knowledge compared to 68.8% of those who were married while all the respondents that were separated had significantly good knowledge about childhood cancers ($p<0.05$). Regarding the year of experience, 49.3% of those with 1-5 years of work experience had good knowledge, 80.0% of those with 6-10 years had good knowledge and 61.8% of those with greater than 10 years of work experience had good knowledge [$p = 0.006$ **(Table 3)**]. Using binary logistic regression, married respondents were 6 times less likely to have poor knowledge compared to

unmarried ones (OR 0.398, 95% CI 0.213-0.745, p=0.004). Also, considering years of work experience, respondents with 6-10 years of experience were 7 times less likely to have poor knowledge (OR 0.349, 95% CI 0.13-0.939, p=0.037) compared to those with less than 5 years of experience **(Table 4)**.

Table 2: Respondent's Knowledge about Childhood Cancers (n = 210)

VARIABLE	FREQUENCY (n)	PERCENTAGE (%)
Awareness of childhood cancer		
Yes	185	88.1
No	25	11.9
Most common childhood cancer		
Leukemia	107	51.0
Lymphoma	24	11.4
Bone tumour	8	3.8
Brain and spinal cord tumour	6	2.9
Rhabdomyosarcoma	3	1.4
Neuroblastoma	2	1.0
Retinoblastoma	2	1.0
Wilms tumour	2	1.0
None response	55	
Most common signs and symptoms		
Continued and unexplained weight Loss	85	40.5
Swelling in the bone	82	39.0
Persistent pain in the bone, joint back/leg	95	45.2
Presence of lump or mass in specific areas	126	60.0
Constant/frequent infection	64	30.5
Excessive bleeding	76	36.2
A Whitish colour behind pupil	49	23.3
Constant tiredness	71	33.8
Noticeable paleness	96	45.7
Nausea that persists or vomiting without nausea	75	35.7
Sudden and persistent fever of unknown origin	48	22.9
Ever seen suspected case(s) of childhood cancer		
Yes	66	31.4
No	144	68.6
I know how to refer any suspected case(s) of childhood cancer		
Yes	97	46.2
No	113	53.8
Knowledge Categories		
Good	117	55.7
Poor	93	44.3

Table 3: Association between Socio-demographic characteristics and Categorized Knowledge

Variable	Categories		Statistics X^2, *p*-value
	Good Knowledge	**Poor Knowledge**	
Sex			
Male	24(54.5%)	20(45.5%)	X^2= 0.031
Female	93(56.0%)	73(44.0%)	P= 0.861
Age			
20-39 years	85(53.8%)	73(46.2%)	X^2=0.950
40-59 years	32(61.5%)	20(38.5%)	P=0.330
Religion			
Christianity	60(56.6%)	46(43.4%)	X^2=0.904
Islam	56(54.4%)	47(45.6%)	p=0.527
Traditional	1(100%)	0 (0.0%)	
Marital Status			
Single	49(43.8%)	63(56.2%)	X^2=15.614
Married	66(68.8%)	30(31.2%)	*p=0.00
Separated	2(100%)	0(0.0%)	
Ethnicity			
Yoruba	105(54.1%)	89(45.9%)	X^2=2.758
Igbo	6(75.0%)	2(25.0%)	p=0.430
Hausa	3(75.0%)	1(25.-%)	
Others	3(75.0%)	1(25.0%)	
Cadre/Designation			
CHEW	48(57.1%)	36(42.9%)	X^2=7.679
Medical Doctor	2(100%)	0(0.0%)	p=0.175
Nurses	22(48.9%)	23(51.1%)	
Health Assistant	8(80.0%)	2(20.0%)	
Health Officers	12(66.7%)	6(33.3%)	
Others	25(49.0%)	26(51.0%)	
Years of Experience			
1-5 years	72(49.3%)	74(50.7%)	X^2=10.099
6-10 years	24(80.0%)	6(20.0%)	p=**0.006***
>10 years	21(61.8%)	13(38.2%)	

***- Statistically significant**

DISCUSSION

This study provides findings about knowledge on case detection of childhood cancers by primary healthcare workers of Osun State. There was a high level of awareness about childhood cancers among the majority of the study participants. This finding is higher than that reported by a previous study conducted among health care workers in Cameroon where more than half of the respondents were aware of childhood cancers.[24] This finding underscores the importance of basic medical education for health workers even in resource-poor settings and shows that when provided with the requisite support, they could make a difference in the early detection of childhood cancer cases on presentation at the health facilities.

In the current study, two-thirds of the respondents identified the presence of lumps or masses as a common symptom of childhood cancers. This is in tandem with the ST SULIAN categorization of signs and symptoms of childhood cancers developed by the Southern African Children's Cancer Study Group (SACCSG).[3] The L symptoms i.e. presence of lumps or masses were also the most recognized symptoms of childhood cancers found in this study. This could be explained by the fact that masses are usually more visible and palpable, compared with other symptoms that patients may present with. Incidentally, a lump or mass is a major symptom of lymphoma and leukaemia which constitute a significant proportion of childhood cancers diagnosed in Nigeria.[4,8] On the other hand, sudden and persistent fever of unknown origin is the least recognized sign. This could be because fever is an indicator of other common ailments such as malaria and could lead to late referral of patients, resulting in late diagnosis of cases such as leukaemia which most frequently present as low-grade fever lasting for days or months (average of two or three weeks).[14,15,25]

In this study, about 44.3% of the respondents had poor knowledge about childhood cancer detection. This might be because the majority of the health-care workers at the PHCs do not receive intensive medical training that doctors and specialist nurses undergo, and thus have limited training in that regard. The mean knowledge score in this study was 13.7 out of a total of 35 which is in congruence with the finding of a study done among Brazilian community health workers where there was poor knowledge among healthcare workers with a mean knowledge score of 11.07 out of 27. [26] This could be a result of inadequate on-the-job training for health workers on childhood cancers, which often requires a high index of suspicion because the presenting symptoms tend to be non-specific and may mimic those of benign conditions.[15] The implication of this average level of knowledge among healthcare workers is that there will be a high level of delayed diagnosis or misdiagnosis which results in patients being referred to tertiary health institutions at an advanced stage of the disease.

More than two-thirds of the healthcare workers in this study reported that they have never seen any case of suspected childhood cancer and nearly half (46.2%) of the respondents could effectively refer to a suspected case of childhood cancer. This result is higher but comparable with the finding of another study conducted in Botswana where only 32.7% of the study participants could effectively refer to a suspected case of childhood cancer.[3] Another study done in rural South Africa also observed that delays in patient referrals were often related to the health workers at the peripheral clinics and hospitals who initially failed to recognize or misinterpret the early warning signs and failed to refer the patients promptly.[25] The low referral rate in our study could be a result of the health workers' inadequate knowledge of the signs and symptoms of

childhood cancers. Late referrals and inappropriate diagnosis contribute significantly to the deaths of children living with childhood cancers, for whom early referral and treatment could have produced a good survival rate. Being married and having 6-10 years of work experience with case detection were the identified determinants of good knowledge about childhood cancers in this study. Therefore, health workers in the PHC setting who are single and have less than 6 years of work experience may benefit from targeted training and mentorship that will improve their knowledge and form the basis for prompt diagnosis and referral of any suspected paediatric cancer case.

Table 4: Determinants of Good Knowledge using Binary Logistic Regression

Variables	Odd ratio	Lower CI	Upper CI	P-value
Marital status				
Single (reference)				
Married	0.398	0.213	0.745	0.004
Year of experience				
1-5 years(reference)				
6-10 years	0.349	0.130	0.939	0.037
>10 years	0.978	0.426	2.294	0.978

Study Limitation: The responses of the healthcare workers in this study were self-reported and have to be accepted as they were stated. However, the respondents were assured of confidentiality and a pretested instrument was used to ensure clarity of questions and minimize social desirability bias.

CONCLUSION

Respondents generally had a good level of knowledge on the detection of childhood cancers. To reduce morbidity and mortality from childhood cancers, targeted efforts should be made to increase the knowledge of PHC workers about childhood cancers through continuous training and workshops.

Conflict of interest

The authors declare no conflict of interest associated with this manuscript.

Acknowledgement

The authors sincerely appreciate the Chairpersons, Medical Officers of Health, Community Health Officers and Chief Nursing Officers of all the Local Government Areas, used in Osun State, for their immense contributions towards the completion of this study. We are also grateful to the healthcare workers who participated in this study.

Reference

1. World Health Organization. Childhood Cancer [Internet]. 2021. Available from: https://www.who.int/news-room/fact-sheets/detail/cancer-in-children
2. Stefan DC. Patterns of Distribution of Childhood Cancer in Africa. J of Tropical Pediatr [Internet]. 2015;61(3):165–73. Available from: https://academic.oup.com/tropej/article/61/3/165/1714119
3. Slone JS, Ishigami E, Mehta PS. Pediatric Cancer Recognition Training in Botswana. Glob Paediatr Heal [Internet]. 2016;3(1):1–

6. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4905160/
4. Joseph A, Balogun O, Akinsete A, Habeebu M, Jimoh M, Lasebikan N, et al. Early Detection of Paediatric Cancer: Equipping Primary Health-Care Workers in Nigeria. Niger J Med [Internet]. 2015;24(1):17–27. Available from: https://www.ajol.info/index.php/njm/article/view/224344
5. Lupo PJ, Spector LG. Cancer progress and priorities: Childhood cancer. Cancer Epidemiol Biomarkers Prev [Internet]. 2020;29(6):1081–94. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9400945/
6. Angione SDA, Akalu AY, Gartrell J, Fletcher EP, Burckart GJ, Reaman GH, et al. Fusion oncoproteins in childhood cancers: Potential role in targeted therapy. J Pediatr Pharmacol Ther. 2021;26(6):541–55.
7. Odunvbun M., Akenzua G. Assessment of the Pattern of Childhood Malignant Diseases. J community Med Prim Heal Care [Internet]. 2015;27(2):67–72. Available from: https://www.ajol.info/index.php/jcmphc/article/view/139386
8. Babatunde O, Akang E, Ogun G, Brown B. Pattern of childhood cancer in University College Hospital, Ibadan during 1991-2010 and comparison with the previous three decades. Paediatr Int Child Heal [Internet]. 2015;35(2):144–50. Available from: https://pubmed.ncbi.nlm.nih.gov/25975278/
9. The Lancet Child & Adolescent Health. Tackling childhood cancer in sub-Saharan Africa. Lancet Child Adolesc Heal [Internet]. 2022;6(7):445. Available from: http://dx.doi.org/10.1016/S2352-4642(22)00161-4
10. Martins QCS, Fábia C, de MoraismFernandes G, Euzébia V, Santos P, Gurerra Azevedo I, et al. Factors associated with the detection of childhood and adolescent cancer in primary health care: A prospective cross-sectional study. J Multidiscip Healthc [Internet]. 2020;13:329–37. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7544884/
11. Alenogbera IO, Isah EC, Isara AA. Availability and Type of Human Resource for Health in Public Primary. J Community Med Prim Heal Care [Internet]. 2016;28(2):11–28. Available from: https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwim_fLAvbj_AhVHhFwKHQYPDhIQFnoECCMQAQ&url=https%3A%2F%2Fwww.ajol.info%2Findex.php%2Fjcmphc%2Farticle%2Fview%2F154689%2F144272&usg=AOvVaw0rILPFy3-jm0AFZCOiNB3O
12. National Primary Health care Development Agency. Minimum Standards for Primary Health Care in Nigeria [Internet]. NPHCDA. 2010. Available from: https://www.google.com/search?client=firefox-b-d&q=Minimum+Standards+for+Primary+Health+Care+in+Nigeria
13. Onyenwenyi AOC, Mchunu GG. Primary health care workers' understanding and skills related to cervical cancer prevention in Sango PHC centre in south-western Nigeria: a qualitative study. Prim Health Care Res Dev [Internet]. 2019;20:e93. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6609971/
14. Pan American Health Organization. Early Diagnosis of Childhood Cancer Early Diagnosis of Childhood Cancer [Internet]. 2014. 1–45 p. Available from: https://iris.paho.org/xmlui/bitstream/handle/123456789/34850/9789275118467-eng.pdf?sequence
15. Fragkandrea I, Nixon JA, Panagopoulou P. Signs and central nervous system (CNS): Early endocrine manifestations: A guide for early recognition. Am Fam Physician [Internet]. 2013;88(3):185–92. Available

from: https://www.aafp.org/pubs/afp/issues/2013/0801/p185.html
16. Stefan DC. A better future for children with cancer in Africa: a dream transforming into reality Dr. D Cristina Stefan- AORTIC president. Infect Agent Cancer [Internet]. 2019;34:1–2. Available from: https://infectagentscancer.biomedcentral.com/articles/10.1186/s13027-019-0252-7
17. Walubita M, Sikateyo B, Zulu JM. Challenges for health care providers, parents and patients who face a child hood cancer diagnosis in Zambia. BMC Health Serv Res [Internet]. 2018;18(1):1–7. Available from: https://bmchealthservres.biomedcentral.com/articles/10.1186/s12913-018-3127-5
18. Camille Q, Cibelle C. Factors Associated with the Detection of Childhood and Adolescent Cancer in Primary Health Care: A Prospective Cross-Sectional Study. 2020;329–37.
19. Bureau of computer services and information technology O state. Osun State Government. Osun State in Brief [Internet]. 2023. p. 1–5. Available from: https://www.osunstate.gov.ng/
20. Federal Government of Nigeria. List of Accredited Colleges of Health Technology in Nigeria [Internet]. 2023. p. 1–6. Available from: https://studentship.com.ng/accredited-college-of-health-technology-in-nigeria/?utm_content=expand_article
21. Osun state Government. Osun state College of Technology, Ilesa [Internet]. 2022. p. 1–3. Available from: https://osunhealthtechilesa.edu.ng/
22. Olawuyi J. Biostatistics: A foundation course in health sciences: formulas for calculating sample size. First Edit. Toyin Alabi Printing Co; 1996. 114–115 p.
23. Geel JA, Stevenson BT, Jennings RB, Krook LE, Winnan SJ, Katz BT, et al. Enough is not enough: Medical students' knowledge of early warning signs of childhood cancer. South African Med J [Internet]. 2017;107(7):585–9. Available from: https://www.researchgate.net/publication/318334769_Enough_is_not_enough_Medical_students'_knowledge_of_early_warning_signs_of_childhood_cancer/link/596445c2aca2728c11274c77/download
24. Afungchwi GM, Hesseling PB, Kouya F, Enow SA, Kruger M. The outcome and cost of a capacity-building training programme on the early recognition and referral of childhood cancer for healthcare workers in North-West Cameroon. Nurs Open. 2020;7(6):2029–38.
25. Stelios P, Linda W, Gita N, Diane M, Janet P. The saint Siluan warning signs of cancer in children: impact of education in rural South Africa. Pediatr blood cancer. 2011;56:314–6.
26. Workman GM, Ribeiro RC, Rai SN, Pedrosa A, Workman DE, Pedrosa F. Pediatric cancer knowledge: assessment of knowledge of warning signs and symptoms for pediatric cancer among Brazilian community health workers. J Cancer Educ. 2007; 22(3):181-5. https://doi.org/10.1007/BF03174334.