Original Article

Analysis of Socio-demographic Characteristics of Adult Haematological Malignancies at a University Teaching Hospital, North-Central Nigeria

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ABSTRACT

There exist strong association between sociodemographics and risk of Haematological malignancies (HMs), documented in a wide range of populations, yet relatively little is known about the extent of their causal link. Sociodemographics are classifiable characteristics of populations. The analysis of these features may aid in identifying disease predictors, which may be essential to incidence reduction and improved outcomes. In this retrospective study design, 78 cases of adult HMs diagnosed at Benue State University Teaching Hospital from June 2012 to July 2019, were analysed to determine the effects of age, sex, religion, tribe, marital status, household income, employment status and educational level on HMs. The study showed that age and sex were predictors of HMs, particularly the middle and older age groups. Marital status, religion, tribe, educational level, employment status and household income showed no significant association with HMs. The findings may help clinicians make informed risk assessments of their patients and provide the appropriate framework for strategic disease control, policy formulation, resource allocation, and further research focus. We advocate for expanded research with focus on the effects of sociodemographics on outcomes of HMs.

Keyword: Socio-demographic, Haematological malignancies, Age, Sex..

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INTRODUCTION

The Global Burden of Disease (GBD) study reported 17.2 million cases of cancer worldwide with 8.9 million deaths in 2016.¹ The burden of haematological malignancy has been estimated at 6.5 % of all cancers worldwide.^{2,3} Haematological malignancies are a clonal heterogeneous group of blood cancers that originate from

cells in the bone marrow or peripheral lymphoid tissue.⁴ They are classified into three major groups: leukaemia, lymphoma, and plasma cell neoplasms.⁵ The overall incidence of haematological malignancies appears to be rising globally, accounting for significantly high morbidity and mortality, most especially in the developing countries.⁶ Population expansion with an increased ageing population has incorporated a diversity of at-risk persons with a much higher degree of heterogeneity in lifestyle habits.

A high prevalence of adult HMs of 49.4% among patients who required bone marrow aspiration evaluation in a 7-year review was earlier reported at Benue State University Teaching Hospital.⁷ By this, HMs had an average incidence rate of 11 cases per annum. Similarly, a higher incidence rate of haematological malignancies of 41.2 cases per annum was reported from the Niger Delta region of Nigeria.⁸ Despite the high risk and burden of HMs, not much is known of their epidemiological characteristics in our setting, which may be due to low index of suspicion, poor referrals and lack of proper reporting and registry. These make the estimation of exact demographic and epidemiological information much more difficult. The incidences of HMs reported in literatures, greatly vary because of varying population types, urban or rural, and methodology. Assessment of HMs by their sociodemographic characteristics could help to determine and to characterise predictors of the disease which may provide a framework for strategic policy formulation, control strategy, resource allocation, and further research focus. Demographic characteristics commonly used in public health statistics include Age, Sex, Race, Ethnicity, Geographic Area, Educational attainment, and Income level.⁹ Differences in genetic, hormonal constitution, as well as environmental exposure, can interact as confounders to alter incidences and outcomes among the different groups.¹⁰ For most HMs, increasing age is an important risk factor and a strong predictor of disease. Analysis by demographic characteristics may also approximate at

what age particular HM affects persons as well as how lifestyle, events, and circumstances, such as marriage and educational status affect health and disease outcomes.⁹ This study, therefore, aimed to determine the relationship between age, sex, religion, tribe, marital status, household income, employment status and educational level and HMs diagnosed at Benue State University Teaching Hospital, Makurdi, Nigeria..

MATERIALS AND METHODS

This was a retrospective study design carried out on adult patients with HMs diagnosed at Benue State University Teaching Hospital from June 2012 to July 2019. Benue is a state in the middle belt region of Nigeria with a total population of 5,840,420 which was a projection from the 2006 population census.^{11,12} The hospital was founded in the year 2006 with about 1500 beds while the Haematology Department of the hospital was established in January 2012. The hospital serves the state and the neighbouring states of Nasarawa, Taraba, part of Cross River and Kogi States in the region. The hospital records of a total of 78 adult patients diagnosed with haematological malignancies were retrieved. Biographical information, including age, sex, religion, tribe, marital status, household income, employment status and educational level were extracted for analysis to determine if there was any relationship between the demographic characteristics and the incidence of HMs in the centre.

Statistical analysis

The data were coded and fed into IBM SPSS Statistics for Windows, version 20 (Armonk. NY: IBM Corp) for analysis using Simple frequencies and cross-tabulations. Chi-Square/Fisher's Exact Test was used to check for associations between two categorical variables. A P- value less than 0.05 was considered statistically significant. The final results were presented as figures and tables.

RESULTS

A total of 78 cases of all types of adult HMs were diagnosed at the centre within the period under review. The age range was from 16 to 85 years with a median age of 54.0 years. The male to female ratio (M:F) was 1:1.1. The study showed age and sex to have significant associations with the occurrence of all types of HMs ($P=0.000$ and $P=0.026$ respectively, age > sex), with the highest incidences in the ages of 36 - 75 years (Table 1). Marital status, religion, tribe, educational level, employment status and household income did not show any significant relationship. (Table 1, Figure 1 and Figure 2)

Table 1: Socio-demographic characteristics of adult patients diagnosed with Haematological Malignancies at Benue State University Teaching Hospital (n=78) between June 2012 to July 2019

Variable	n(%)	P - Value
Sex		0.026*
Male	38(48.7)	
Female	40(51.3)	
M:F	1:1.1	
Age Group		0.000*
16-35	22(28.2)	
36-55	20(25.6)	
56-75	32(41.0)	
≥76	4(5.1)	
Median Age	54.0 years	
Marital Status		0.928
Married	43(55.1)	
Single	24(30.8)	
Divorced	6(7.7)	
Widowed	5(6.4)	
Religion		0.811
Traditional	2(2.6)	
Christianity	64(82.1)	
Islam	9(11.5)	
Others	3(3.8)	
Tribe		0.566
Hausa	6(7.7)	
Idoma	20(25.6)	
Igede	7(9.0)	
Tiv	35(44.9)	
Yoruba	2(2.6)	
Others	4(5.1)	
Educational Level		0.328
Informal	5(6.4)	
Primary	22(28.2)	
Secondary	23(29.5)	
Tertiary	28(35.9)	
Employment Status		0.472
Government- Employed	10(12.8)	
Self-Employed	28(35.9)	
Unemployed	29(37.2)	
Student	9(11.5)	
Retired	2(2.6)	
Household Income (₦)		0.632
< 10,000.0	28(35.9)	
10,000.0-24,999.0	28(35.9)	
25,000-100,000.0	15(19.2)	
> 100,000.0	7(9.0)	

Chi-Square (Fisher's Exact) Test: P* (Significant)

Figure 1: All types of Haematological Malignancies by Sex

Chi-Square (Fisher's Exact) Test: Value= 17.743830, P= .026*

Keys:

CLL:Chronic lymphocytic leukaemia; *CML*:Chronic myeloid leukaemia;
MDS:Myelodysplastic syndrome; *ALL*:Acute lymphoblastic leukaemia;
MM:Multiple myeloma; *AML*:Acute myeloblastic leukaemia;
NHL:Non-hodgkin's lymphoma; *SLL*: Small lymphocytic lymphoma;
CLL/PL:Chronic lymphocytic leukaemia / prolymphocytic leukaemia;
HL:Hodgkin's lymphoma; *PLL*:Prolymphocytic leukaemia

Figure 2: All types of Haematological Malignancies by Age group (Years), both sexes

Chi-Square (Fisher's Exact) Test: Value=59.018, $p = .000^*$

Keys:

CLL:Chronic lymphocytic leukaemia; **CML:**Chronic myeloid leukaemia;
MDS:Myelodysplastic syndrome; **ALL:**Acute lymphoblastic leukaemia;
MM:Multiple myeloma; **AML:**Acute myeloblastic leukaemia;
NHL:Non-hodgkin's lymphoma; **SLL:** Small lymphocytic lymphoma;
CLL/PL:Chronic lymphocytic leukaemia / prolymphocytic leukaemia;
HL:Hodgkin's lymphoma; **PLL:**Prolymphocytic leukaemia

DISCUSSION

Cancer incidence and mortality are said to rise exponentially with age.¹³ Statistics worldwide indicate that 1/4 to 1/3 of contemporary humans that live beyond their third decade shall be diagnosed with cancer at some time in their lives.¹⁴ Although there is an incidence of cancer throughout postnatal life, the incidence is negligible through the first decades but increase to exponential rate after the age 40 years.^{13,15}

Our study showed age and sex to be significant predictors of all types of HMs ($P=0.000$ and $P=0.026$ respectively, age > sex). These findings agreed with others across many social and geographical boundaries. Real-world evidence from observational data obtained in routine clinical practice corroborates these. For most malignancies, increasing age is a singular most important risk factor and strong predictor.^{9,16} Although, age at diagnosis plays an important role in prevalence, incidence and survival, HMs exhibit much greater variation than most other cancers. With different subtypes predominating at different ages, HMs can be diagnosed at any age; the median age at diagnosis ranging from 15.3 years for acute lymphoblastic leukaemia to 77.3 years for chronic myelomonocytic leukaemia.¹⁶ This median diagnostic age of 15.3-77.3 years for their HMs, though with paediatric cases inclusive, is within our reported median diagnostic age of 54.0 years for all types, with the highest clusters around the middle and older age groups of 36-55 years and 56-75 years respectively.

Our study found a slight preponderance of HMs in females compared to males with M:F of 1:1.1. This difference, though seemed small, was statistically significant ($P=0.026$). A significant number of epidemiological research have unequivocally shown gender to be an important predictor of many diseases in terms of prevalence, incidence and outcomes. Most of these are male-dominated with few others predominating in females. Again, just as in age, this may not strictly apply frequently to all HMs, depending

on the sub-types and variants. A study at a University Teaching Hospital Calabar by Akaba *et al*¹⁷ reported male to female ratio of 1.1:1 with a preponderance of HMs in males, contrary to our finding. However, in agreement with ours, they found the age range of adult HM to be 16 - 84 years with individual malignancies exhibiting varying peak ages. A similar report from the UK also noted the male rate to be more than double the female rate for several myeloid and lymphoid subtypes.¹⁸ This study in addition reported gender and age as disease determinants.^{18,19}

Marital status, religion, tribe, educational level, employment status and household income did not show significant relationship to the occurrence of HMs in our study. Educational attainment and household income (purchasing power) are important components of the three dimensions of human development index (HDI). The third of which is long and healthy life (life expectancy at birth).¹⁹ Edwin Leuven, Erik Plug and Marte Rønning in their work on the effect of education on cancer risk in Norway found that education has little if any impact on cancer risk.²⁰ This was said to hold for all cancers with two exceptions. The school reform (education) was observed to lower the risk of lung cancer for men but increased the risk of colorectal cancer for women, which were the exceptions. Although their finding may have agreed with ours about HMs, there were, however, other works, some of which reported increased risk while a few others reported reduced cancer risk with education. Lleras-Muney²¹ reported that people live longer because of an increase in education and that since cancer incidence increases with advancing age, it could therefore imply that if more educated men and women live longer lives, in the long run, we should see that higher levels of education cause a rise in cancer incidence and cancer mortality. For those with findings of reduced cancer risk with increasing education, the explanation was that because educated men and women would be better

informed on how to seek and respond to the cancer treatments, we should see reduced cancer risks with increasing education. Along the same line, Grossman²² and Cutler and Lleras-Muney²³ argue that differences in resources (household income), preferences and knowledge (education) may explain why more educated men and women face lower health risks. However, for all cancers combined, including HMs, except for skin non-melanoma cancers, the highest incidence rates are associated with the high-income countries.^{3,24} People in low- and middle-income countries are, however, more likely to die of cancer than those who live in high-income countries.

In summary, While high-income countries, with better education and income, have higher incidences and prevalence of all cancers but lower mortality, low- and middle-income countries, with poorer education and income, though, have a lower incidence of cancers, they however have higher mortality from all cancer types. These seemingly higher incidences and prevalence in high-income countries may likely be due to availability of diagnostic facilities for early diagnosis, better awareness of the population, higher health seeking behaviour, and better documentation in high-income countries compared to the low-income ones. The contrary is usually the case in low-income countries resulting in poorer outcomes and mortality. The focus of this study was on demographic characteristics as predictors of HMs. Though, age and sex were significant predictors, educational, household income levels and others showed little or no effects. The effects of demographics on the burden and outcome of HMs could be the focus of future research.

CONCLUSION

The study has shown that age and sex are significant predictors of all types of HMs, affecting predominantly middle to older ages. Marital status, religion, tribe, educational level, employment status and household income did not show statistically significant relationship in our study. The findings may help

clinicians make informed risk assessments of their patients and provide the appropriate framework for strategic disease control, policy formulation, resource allocation, and further research focus. We advocate for expanded research with a focus on the effects of sociodemographics on outcomes of HMs.

Conflict of interest: None to declare.

REFERENCES

1. Fitzmaurice C, Akinyemiju TF, Lami FH Al, Alam T, Alizadeh-Navaei R, Allen C, *et al.* Global, Regional, and National Cancer Incidence, Mortality, Years of Life Lost, Years Lived With Disability, and Disability-Adjusted Life-Years for 29 Cancer Groups, 1990 to 2016 A Systematic Analysis for the Global Burden of Disease Study. *JAMA Oncol.* 2018;4(11):1553–68.
2. Mounia EE, Manal EE, Redouane B, Meryem O and Mohammed B. Distribution and features of haematological malignancies in Eastern Morocco: A retrospective multicenter study over 5 years. *BMC Cancer.* 2016;16:159. DOI 10.1186/s12885-016-2205-5
3. Jacques F, Isabelle S, Rajesh D, Sultan E, Colin M, Marise R, *et al.* Cancer incidence and mortality worldwide: Sources, methods and major patterns in GLOBOCAN 2012. *Int J Cancer.* 2015;136:E359–86. DOI: 10.1002/ijc.29210
4. Hoffbrand AV, Moss PAH. Haematological malignancy: aetiology and genetics. 6TH ed. *Essential Haematology.* UK: Blackwell Publishing Ltd; 2011. 150–272 p.
5. Rodriguez-Abreu D, Bordoni A, Zucca E. Epidemiology of haematological malignancies. *Annals of Oncology* 18 (Supplement 1): i3–i8, 2007 doi:10.1093/annonc/mdl443
6. Gaspar BL, Sharma P, Das R. Anemia in malignancies? Pathogenetic and diagnostic considerations. *Haematology.* 20:1, 18–25, DOI: 10.1179/1607845414Y.0000000161.
7. Onoja AM, Otene SA, Onoja AT, Ibrahim IN, Mke A, Okolie I, *et al.* Prevalence and Nature of Adult Hematological Malignancies Using Bone Marrow

- Aspiration Cytology in a Tertiary Health Facility: A Seven-Year Retrospective Review. *Wes J Med Biomed Sci.* 2021;2(1):39–45. DOI: 10.46912/wjmbs.39.
8. Nwannadi AI, Olusayo A, Bazuaye GN, Halim NKD, Omoti CE. The epidemiology of haematological malignancies at the university of Benin teaching hospital: A ten-year retrospective study. *Internet J Epidemiol.* 2010;9(2):1–6. doi.org/10.5580/1fbb
 9. New Mexico's Indicator-Based Information System - Demographic Characteristics [Internet]. New Mexico Department of Health, Indicator-Based Information System for Public Health Web site: 2021 [cited 2021 May 13]. Available from: <https://ibis.health.state.nm.us/topic/population/demographics/Characteristics.html>
 10. Emery EE, Hunt MG. Sociodemographic Characteristics Treatment Adherence in Late-Life Labeling and nutritional education. In: *Handbook of Assessment in Clinical Gerontology.* 2nd ed. Academic Press; 2010. p. 427–57.
 11. Ortserga DS, Kwaghsende FK, Dam DP, Kile TI, Ujoh F, Gyuse TT. Intensification of Arable Agricultural Land Use As A Response to Changing Agro-Ecological Context In The Benue Basin, Nigeria. *Adv Soc Sci Res J.* 2019;6(2):400–19. DOI:10.14738/assrj.62.5906
 12. The Federal Republic of Nigeria. Legal notice on publication of 2006 census final results Official Gazette 2009;96(2):1–42.
 13. DePinho RA. The age of cancer. Vol. 408, *Nature.* 2000. p. 248–54. DOI: 10.1038/35041694
 14. Duesberg P, Li R, Fabarius A, Hehlmann R. The chromosomal basis of cancer. *Cell Oncol.* 2005;27(5–6):293–318. 10.1155/2005/951598
 15. Coelho AM. Aging Happens by Default. *J Gerontol Geriatr Res.* 2016;05(06):5–6. DOI: 10.4172/2167-7182.1000369
 16. Li J, Smith A, Crouch S, Oliver S, Roman E. Estimating the prevalence of haematological malignancies and precursor conditions using data from Haematological Malignancy Research Network (HMRN). *Cancer Causes Control.* 2016;27(8):1019–26. DOI: 10.1007/s10552-016-0780-z
 17. Kingsley A, Benedict N, Idongesit A, Okon Bassey B, Effiong O, Emem P, *et al.* Epidemiological Pattern of Adult Haematological Malignancies in a Tertiary Hospital in Cross River State. *Int Res J Oncol.* 2019;2(1):1–9.
 18. A Smith, D Howell, R Patmore, A Jack, and E Roman. Incidence of haematological malignancy by sub-type: A report from the Haematological Malignancy Research Network. *Br J Cancer.* 2011;105(11):1684–92. DOI: 10.1038/bjc.2011.450
 19. Freddie B, Isabelle S. Treating Childhood Cancer in Low- and Middle-Income Countries. In: Gelband H, Jha P, Sankaranarayanan R, Horton S, editors. *Disease Control Priorities, Third Edition (Volume 3): Cancer.* 3rd ed. Washington, DC: World Bank Group; 2015. p. 121–46. 10.1596/978-1-4648-0349-9_ch7
 20. Leuven E, Plug E, Rønning M. Education and cancer risk. *Labour Econ.* 2016;43(777):106–21. DOI: 10.1016/j.labeco.2016.06.006
 21. Lleras-Muney A. The relationship between education and adult mortality in the United States. *Rev Econ Stud.* 2005;72(1):189–221. DOI: 10.1111/0034-6527.00329
 22. Grossman M. Education and Nonmarket Outcomes. In: Hanushek E, Welch F, editors. *Handbook of the Economics of Education.* City University of New York Graduate Center and National Bureau of Economic Research: Elsevier; 2006. p. 577–633. 10.1016/S1574-0692(06)01010-5
 23. Cutler MD, Lleras-Muney A. Understanding Differences in Health Behaviors by Education. *J Heal Econ.* 2010;29(1):1–28. doi:10.1016/j.jhealeco.2009.10.003.
 24. McGuire S. *World Cancer Report 2014.* Geneva, Switzerland: World Health Organization, International Agency for Research on Cancer, WHO Press, 2015. WILD BWS, Christopher P, editors. Vol. 7, World Health Organization. Lyon Cedex 08, France: the International Agency for Research on Cancer; 2016. 418–419 p. DOI: 10.3945/an.116.012211