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Relationship between Caregivers' Socio-Economic Status and Childhood Tuberculosis in Bauchi State, Northeastern Nigeria

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Abstract

Background: Childhood tuberculosis (CTB), remains a neglected aspect of the TB epidemic despite accounting for 10% of the global TB burden and being responsible for 210,000 deaths in 2016.Â Â Furthermore, TB research, prevention, and control worldwide has predominantly focused on adults, neglecting children 0-14 years old.Â Â In Nigeria, there is paucity of research studies examining the relationship between reporting of CTB and caregiversâ€™ socio-economic status (SES).Â Â

Study Design: Observational study

Methods: This quantitative cross-sectional study examined the relationship between caregiversâ€™ socioeconomic status (SES) and the reporting of TB in children aged 0-14 years. Using the abridged version of World Health Organizationâ€™s (WHO) QOL tool, the WHOQOL-BREF, data were collected individually in a face-to-face setting from caregivers (*n*= 47) whose children had been diagnosed with TB in Bauchi State, Northeastern Nigeria, over a 5-year period.Â Data were collected in the same manner from another set of caregivers of children without TB (*n*= 47) within the same period and setting.Â

Results: Logistic regression revealed a statistically insignificant relationship (*p*>0.05) between the caregiversâ€™ SES and the reporting of childhood TB.Â Â

Conclusion: This study should be repeated with an additional validated tool that measures SES across diverse, resource-limited settings like Nigeria.Â

Introduction

Nigeria, with an estimated 407,000 TB cases in 2016, ranked seventh among the 30 highest TB burdened countries in the World and second in Africa (World Health Organization [1]. Furthermore, an estimated 56,000 children representing 7% of the total burden were children aged 0-14 years [1].Â Yet, children often suffer neglect with respect to TB preventive and control efforts [2] [3] [4] [5] [6].Â Â

However, research has shown that the presence of CTB in a community is an indication of having a reservoir of theÂ *mycobacterium tuberculosisÂ* bacteria as well as the possibility of having future cases of infections if preventive measures are not taken [5].Â Â These preventive measures include, but not limited to:Â strengthening of global surveillance of CTB, studying the roles of national TB programs (NTPs) in curbing the spread of CTB, and better identification of risk factors for CTBÂ [7].Â Â

Risk factors for the occurrence of CTB also vary by regions of the world [7]. Issues such as parentsâ€™ or caregiversâ€™ nationalities, immigration status, and race and ethnicity remain key in the occurrence of CTB in North America and EuropeÂ [8] [7] [9]. Moreover, SES indices such as poverty, crowding, and malnutrition were found to be associated with a greater risk of CTB incidence in low and middle income countries [10] [7].Â Â In Nigeria, although a recent study by [27] has established a statistically significant relationship between caregiversâ€™ quality of life (QOL) and CTB incidence, there is paucity of research studies examining such a relationship between caregiversâ€™ SES and the CTB incidence.Â Â Caregiversâ€™ SES entails their educational status, income, occupation, access to improved water and sanitation, and household wealth/assets [11] [12].Â Â

Caregiversâ€™ educational status is an important external variable that influences patronage of childhood health care services.Â Â Their background education qualification, for instance, makes it easier for caregivers to comprehend the aims and objectives of childhood immunization program, its benefits, probable unpleasant effects and their remedies.Â This may explain why cases of vaccine preventable diseases are more prevalent in the Northern than Southern Nigeria. The Northern region, known for its strong cultural beliefs and diversity, is comparatively less literate, poorer and less employed than its Southern counterpartÂ [13].Â Â The purpose of this study was to examine the relationship between CTB reporting and caregiversâ€™ SES in Bauchi State, Northeastern Nigeria. Â

Methods

Bauchi state, nicknamed â€˜Pearl of Tourismâ€™, is one of the six states in the northeastern region of the country, divided into 20 local government areas (LGAs) with a projected population of 6,056,519 million people comprising of 51% males and 49% females [14]. It occupies a total land area of 49,119 kmÂ², representing about 5.3% of the countryâ€™s total land mass and is located between latitudes 9Â° 3' and 12Â° 3' north and longitudes 8Â° 50' and 11Â° east. It is multiethnic and multilingual in nature with an estimated 55 tribal groups, with Hausa Language being the most widely spoken across all parts of the state.Â Â The economy is driven essentially by agriculture and tourism apart from few manufacturing industries in iron, steel, water, ceramics, food and beverages.Â Â The vast fertile soil and water resources available in the state makes crops production and animal husbandry the main stay of its economy, coupled with the presence of the famous Yankari Game Reserve, which is said to be the biggest game reserve in West Africa [15].Â Â

The study was a cross-sectional survey of caregivers whose children had been diagnosed with CTB in Bauchi State, Northeastern Nigeria from January 1, 2011 to December 31, 2015 as recorded in the State Ministry of Health CTB database.Â Â The SES was measured through face-to-face interviews with a sample of caregivers, using an internationally recognized tool developed and used by the WHO, the WHOQOL-BREF questionnaire [31].Â Â It comprises of 26 questions, 24 of which are spread in four domains: physical, psychological, social relations, and environment.Â Â These domains consisted of seven, six, three, and eight questions respectively. The questions were measured on a five-point scale ranging from 1 to 5. The domain scores were scaled in a positive direction. The overall well-being of the respondents was dichotomized into poor or good based on WHO standard procedures.Â Â The remaining two questions are general: One linked to the self-perceived QOL and the other to contentment with health.Â Â Summed scale scores for all the items within the QOL measure were created.Â Additionally, transformed scale scores were also created as per the scoring instructions provided on the WHO-QOL BREF questionnaire.Â Â These were the scores used in the analysis.Â Â

All respondents had signed consent forms before being interviewed.Â Â Their SES was measured using their educational status as proxy, since it was the only SES related variable in the questionnaire.Â Â Personal identifiers such as names, street addresses, and telephone numbers were excluded so as to ensure that the collected data remains confidential, in accordance withÂ the general conduct of ethical biomedical studies as defined by the WMA Declaration of Helsinki in 1964 and revised in 2013.Â Â Information on CTB was extracted and reviewed retrospectively by the researcher, from the Bauchi State CTB database for the 5-year period, taking care to avoid double reporting.Â Â

The inclusion criteria included a) only children aged 0-14 years old diagnosed by a physician with CTB, b) all cases would have to meet WHO/National Tuberculosis Programme (NTP) case definition for CTB [16] [17], c) all cases diagnosed and treated in any of the eight selected DOTS treatment centers, and, d) all CTB cases diagnosed and treated between January 01, 2011 to December 31, 2015.Â Â Conversely, the exclusion criteria included: a) all children outside the 0-14 year age range, b) all cases that have not met the WHO/NTP case definition for CTB, c) all CTB cases diagnosed and treated outside the NTP and/or within facilities that are not designated as DOTS treatment centers by the NTP, and, d) all CTB cases diagnosed before January 01, 2011 or after December 31, 2015.Â Â

The sample size for the study was determined using the formula,Â Â [18].Â The formula was utilized in a similar cross-sectional study conducted byÂ [19] in order to assess the attitude of public health workers in Calabar, Cross River State of Nigeria, towards people living with HIV/AIDS using the AIDS attitude scale.Â Â Similarly,Â [20] used the formula to determine the sample size in an experimental study of HIV positive patients on care and treatment in Kisumu District, Nyanza Province, Kenya.Â Â Â

Assuming a non-response rate of 20%,Â the minimum required sample size was 53, where, 6% = proportion of Nigerian children aged 0-14 years diagnosed with TB in 2014 [21].Â Therefore, the sample size for the study was 53 caregivers of CTB cases. Bearing in mind that Bauchi State has a total population of 6,056,519 people, 3 geopolitical zones, 20 Local Government Areas (LGAs), and 196 directly observed treatment, short-course (DOTS) treatment centers, a representative sample of these 53 caregivers of CTB cases were obtained using the multi-staged sampling technique.Â Â These were proportionally contributed by each of the 8 randomly selected DOTS centers through systematic random sampling technique [22].Â Â

Statistical Analysis

The data generated for the study was analyzed using SPSS version 21Â [23].Â Â Demographic characteristics of the respondents such as gender, age and marital status were analyzed. The relationships between caregiversâ€™ SES and the reporting of CTB was determined by multiple logistic regression (MLR) model [27] [28] [29] [30]. The reporting of CTB was measured as a dichotomous variable where 0 = no TB and 1 = TB present.Â Â Therefore, based on the sample size calculation above, 53 caregivers of CTB cases and 53 caregivers of children without CTB (controls) were randomly selected and interviewed face to face with the help of the WHO-QOL BREF questionnaire.Â Â The assumptions for this test were met: the dependent variable is dichotomous, and has been coded as such; all the variables in the WHOQOL-BREF questionnaire were included in the analyses; an adequate sample size was calculated.Â Â Â Â

Ethical Clearance

This study was authorized by the Bauchi State Ministry of Healthâ€™s Research Ethics Committee (HREC), having been assured that the study would be strictly for academic research purposes and that its outcomes would be treated with utmost confidentiality. The HREC was further assured that identifiers such as the name of CTB patients, their parents and/or caregivers, addresses were coded to safeguard against identification by people outside the research community.Â Â Secondly, each of the potential participants was adequately informed about the study to enable him/her decide whether to participate or not.Â Â For those who agreed to participate, a written consent was obtained from each one of them in line with ethical standards.

Results

A total 47 caregivers of CTB cases, representing 88.7% of those invited consented and were interviewed by the researcher in their communities of residence.Â Â In the same way, 47 caregivers of children without TB were interviewed as control group under the same procedure bringing to 94 the total number of respondents interviewed.Â Â The data thus obtained was subjected to descriptive and inferential statistics using the SPSS version 21.Â Â Logistic regression analysis was done after ensuring that all its assumptions were met, viz:Â Â the dependent variable was dichotomous; the dependent variable was coded accordingly (children with TB=1, children without TB=0); all the variables in the WHOQOL-BREF questionnaire were included in the analyses; the independent variables are independent of each other; the independent variables are linearly related to the log of the odds ratio; and finally the large sample size of 94 respondents.Â

As can be seen in table 1, there were two types of respondents: 47 (50%) respondents were caregivers whose children do not have TB and 47 (50%) were caregivers whose children were diagnosed with TB.Â Â There were no missing data: there were equal number of respondents in each of the two groups of interviewees, no TB and TB present respectively.

Presence of TB among the Children of Respondents

Â					
Â		Frequency	Percent	Valid Percent	Cumulative %
Valid	No TB	47	50.0	50.0	50.0
	TB present	47	50.0	50.0	100.0
	Total	**94**	**100.0**	**100.0**	Â

Â Furthermore, respondents whose children had no TB appear to be more educated, as 34 of them (72.4%) either attended high school or college, than those whose children had TB, where less than half of them (23 or 49%) attended either high school or college as shown in table 2.Â

Demographic Characteristics of Respondents

Â	**Educational Status**		**Number of Children with TB**	**Number of Children without TB**	**% Children with TB**	**% Children without TB**	**Total**
Â	**Â**	Â	Â	Â	Â	Â	Â
Â	None	6	4	12.8	8.5	10	Â
	Elementary	18	9	38.3	19.2	27	Â
	High School	13	20	27.7	42.6	33	Â
	College	10	14	21.3	29.8	24	Â

Â

Lastly, as can be seen in table 3, the variable of education, which was used as a sole measure for socio-economic status of the caregivers (since the WHOQOL-BREF questionnaire does not contain the other two variables for measuring socio-economic status, namely income and occupation) did not make a significant contribution to the model-education, education (1), education (2) and education (3) becauseÂ *p*>0.05 in all of them.Â Thus, it can be concluded that the relationship between caregiversâ€™ SES and the reporting of CTB is not statistically significant, there by accepting the null hypothesis.Â Â

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Variables in the Equation

Â	Â	Â	Â	Â	Â	Â	95% C.I. for Unadjusted OR			Â Â Â Â Â Â 95% C.I. for Adjusted OR		
Â	Â	B	S.E.	Wald	df	Sig.	Exp(B)	Lower	Upper	Exp(B)	Lower	Upper
	Education	Â	Â	4.270	3	.234	Â	Â	Â	Â	Â	Â
	Education (1)	2.761	1.506	3.360	1	.067	15.812	.826	302.679	.009	.000	2.072
	Education (2)	2.714	2.063	1.730	1	.188	15.089	.264	861.150	.140	.005	4.099
	Education (3)	4.728	2.784	2.884	1	.089	113.075	.483	26492.696	.133	.012	1.548

Discussions

Following the face to face interviews with both caregivers of children with TB and caregivers of

children without TB, it was revealed that caregivers of CTB cases had a lower literacy level (as only 49% of them attended either high school or college) compared with the control group, where 72.4% of them attended either high school or college.Â Â These findings were similar to those discovered in India and Egypt that also found low literacy levels among caregivers of CTB cases [24] [25].Â Â However, results from logistics regression analysis indicated that caregiversâ€™ educational status, is not related to the reporting of TB in their children becauseÂ $p>0.05$.Â Â

Nevertheless, as shown earlier, caregivers whose children had TB were less educated than those whose children had no TB.Â Â The more educated caregivers in the latter group may have better jobs with higher incomes, higher standards of living and their childrenâ€™s health may likely be above average [26].Â Â In this respect, it can be argued that caregiversâ€™ educational status (a proxy measure of their SES in this study) is inversely related to the reporting of TB in their children.Â Â

However, educational status alone is not a sole measure of the SES but part of a continuum of variables used by researchers to measure it.Â Â For instance, the Brazilian Association of Research Companies Economic Classification Criterion and the WAMI index are two separate tools used respectively by [12] and [11] to measure the SES of adult caregivers of children whose children suffered from chronic illnesses in resource limited settings. Â

Study Limitations

The use of educational status of the respondents as a proxy measure of their SES is therefore a major limitation of the study.Â Furthermore, as with all cross sectional study designs, this study was faced with concerns of selection and information (interviewer) biases as well as confounding [32].Â Â The former was controlled through randomization of the study participants while the latter was controlled because the author personally interviewed all the study participants face to face using a standard valid tool, the WHOQOL-BREF questionnaire, thereby reducing differential misclassification to the barest minimum [32].Â Â Confounding was controlled by matching the age and gender of each child with TB with another child without TB [33].Â Â This ensured that the study participants do not differ significantly with respect to possible confounders of age and gender.

Conclusion

Although the study found out that caregivers whose children had TB were less educated than those whose children had no TB, it could not establish a statistically significant relationship between the caregiversâ€™ SES and reporting of TB in their children.Â Â It is therefore strongly recommended that the study be repeated with an additional validated tool that measures SES such as the tool developed by [11] in measuring SES across diverse, resource-limited settings like Nigeria.Â Â Apart from maternal education, the WAMI index has incorporated several aspects of SES such as access to improved water and sanitation, household wealth (assets), and income.Â Â Another tool that measures SES, which could be used for future studies, is the one used by [12] in measuring the SES of caregivers whose children suffered from Osteogenesis Imperfecta (OI) in Brazil.

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Conflicts of Interest

The authors wish to declare that there is no any conflict of interest or royalty attached to this study.

Abbreviations

TB - Tuberculosis

CTB â€“ Childhood Tuberculosis

SES â€“ Socioeconomic Status

WHO- World Health Organization

NTP â€“ National Tuberculosis Control Programme

QOL â€“ Quality of Life

LGA â€“ Local Government Area

WMA â€“ World Medical Association

DOTS â€“ Directly Observed Treatment Shortcourse

HIV â€“ Human Immunodeficiency Virus

AIDS â€“ Acquired Immune Deficiency Syndrome

MLR â€“ Multiple Logistic Regression

WHOQOL-BREF â€“ Abbreviated version of the WHOâ€™s Quality of Life Questionnaire

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