

Association between Socio demographic characteristic and RHD

The table 1 represent the cross-tabulation of association between RHD prevalence and socio-demographic factors. It contains frequency, percentages, chi-square, and P-value

Table 1. Socio-demographic factors of respondents.

Variables	RHD		P value *
	Frequency (%)	Yes	
Age			<0.001*
5-15	32(8.3)	16(50)	16(50)
16-25	53(13.8)	31(58.5)	22(41.5)
26-35	49(12.8)	15(30.6)	34(69.4)
>35	250(65.1)	77(32.8)	173(69.2)
Gender			0.016*
Male	126(32.8)	35(27.8)	91(72.2)
Female	258(67.2)	104(40.3)	154(59.7)
Marital status			<0.001*
Single	89(23.2)	47(52.8)	42(47.2)
Married	264(68.8)	89(33.7)	175(66.3)
Separate/Divorce	31(8.1)	3(9.7)	28(90.3)
Level of education			0.005*
Primary school	116(30.2)	56(48.3)	60(51.7)
Secondary or above	23(6.0)	6(26.1)	17(73.9)
Illiterate	245(63.8)	77(31.4)	168(68.6)
Father's education			0.689
Primary school	25(6.5)	11(44.0)	14(56.0)
Secondary or above	5(1.3)	2(40.0)	3(60.0)
Illiterate	354(92.2)	126(35.6)	228(64.4)
Mother's education			0.376
Primary school	14(3.9)	3(21.4)	11(78.6)
Secondary or above	1(0.3)	0(0.0)	1(100)
Illiterate	369(96.1)	136(36.9)	233(63.1)
Area of living			<0.001
Urban	29(7.6)	0(0.0)	29(100)
Rural	355(92.4)	139(39.2)	216(60.8)
Occupation			<0.001*
Famer	288(75.0)	86(29.9)	202(70.1)
Professional	16(4.2)	4(25.0)	12(75.0)
Unemployed	80(20.8)	49(61.3)	31(38.8)
Father's occupation			0.442

Famer	364(94.8)	130(35.7)	234(64.3)	
Professional	1(0.3)	0(0.0)	1(100)	
Unemployed	19(4.9)	9(47.4)	10(52.6)	
Mother's occupation				0.814
Famer	369(96.1)	134(36.3)	235(63.7)	
Unemployed	15(3.9)	5(33.3)	10(66.7)	
Size of family				<0.001*
<5	296(77.1)	76 (25.7)	220(74.3)	
>=5	88(22.9)	63(45.3)	25(10.2)	
Person into room				0.001*
<5	285(74.2)	89(31.2)	196(68.8)	
>=5	99(25.8)	50(50.5)	49(49.5)	
Ubudehe Social class				0.001*
Ubudehe category 1	136(35.4)	56(41.2)	80(58.8)	
Ubudehe category 2	152(39.4)	64(42.1)	88(57.9)	
Ubudehe category 3	96(25.0)	19(19.8)	77(80.2)	
Water supply				<0.001*
Supply of surface	58(15.1)	1(1.7)	57(98.8)	
Tubewell/ground water	326(84.9)	138(42.3)	188(63.8)	
Sleeping area				<0.001*
On bed	114(29.7)	11(9.6)	103(90.4)	
On floor	270(70.3)	128(47.4)	142(52.6)	
Brushing teeth of meal and wake up				<0.001*
Yes	42(10.9)	1(2.4)	41(97.6)	
No	342(89.1)	138(40.4)	204(59.6)	

Table 1. show that there are various factors examined for association, the study shown a statistical significance between RHD and respondents age (P value <0.001), gender (P value 0.016), marital status (P value <0.001), education level (P value 0.005), occupation (P value <0.001), residence area (P value <0.001), family size (P value <0.001), room sharing (P value 0.001), ubudehe category (P value 0.001), water supply (P value <0.001), Sleeping area (P value <0.001), Brushing teeth of meal and wake up (P value <0.001), knowledge of RHD (P value 0.002), Recurrent sore throat with fever (P value <0.001) and having join pain at knees and ankles with fever (P value <0.001).

Table 2 represent the logistic regression of socio-demographic characteristics that became statistically significant (P<0.05) and shows in the previous table 1 and the Adjusted Odds ration were calculated to determine its statistical association with the RHD occurrence.

Table 2: Logistic regression to examine association between RHD occurrence and independent variables.

Variables	AOR	95%CI		P value *
		Lower	Upper	
Age				
5-15	ref			
16-25	1.997	0.719	5.542	0.184
26-35	1.507	0.401	5.662	0.544
>35	1.083	0.286	4.097	0.906
Gender				
Male	ref			
Female	2.149	1.282	3.601	0.004*
Marital status				
Single	ref			
Married	0.454	0.279	0.740	0.002*
Separate/Divorce	0.096	0.027	0.338	<0.001*
Level of education				
Primary school	ref			
Secondary or above	0.521	0.155	1.743	0.29
Illiterate	0.573	0.314	1.044	0.069
Occupation				
Famer	ref			
Professional	1.282	0.324	5.070	0.459
Unemployed	3.494	1.702	7.173	<0.001*
Size of family				
<5	ref			
>=5	7.639	3.948	14.7783	<0.001*
Person room				
<3	ref			
>=3	0.696	0.364	1.331	0.273
Ubudehe Social class				
Ubudehe category 1	ref			
Ubudehe category 2	1.272	0.775	2.088	0.053
Ubudehe category 3	0.573	0.3	1.096	0.233
Water supply				
Surface water	36.316	4.943	266.807	<0.001
Tubewell/ground water	ref			
Sleeping area				
On bed	ref			
On floor	7.746	3.812	15.741	<0.001*

Brushing teeth of meal and wake up

Yes	ref			
No	8.885	1.094	72.157	<0.001*

***Statistically significant at P value <0.05; CI=Confidence interval; ref: reference =1**

As shown in the table 4.4 multivariate shows statistical association between the significant increased risk to develop RHD and other factors.

Female were 2.147 more time likely to develop RHD than male (AOR=2.147, 95% CI 1.282-3.601) with the p-value 0.004. Being 5 and more family member were 7.639 more time likely to develop from RHD than being less 5 family members (AOR= 7.639, 95% CI: 3.948-14.7783) with the p-value <0.001. Using the surface waters were 36.316 more time likely to develop RHD than the one who are using water from tube well or ground water (AOR = 36.316, 95% CI: 4.943- 266.807) with the p-value <0.001. Sleeping of the floor were 7.746 more time likely to develop RHD than those who are sleeping on the bed (AOR = 7.746, 95%CI: 3.812–5.741) with the p-value <0.001. Respondent who was not brushed teeth after meal and waked up were 8.885 more time likely to develop RHD than the those who used to brush after meals and wake up, (AOR = 8.885, 95% CI: 1.094-72.157) with the p-value <0.001. Being unemployed were 3.494 more time likely to develop RHD than those who were the farmer (AOR= 3.494, 95% CI: 1.702-7.173) at p-value <0.001. Being separated/divorced with its partner were 0.204 less time likely to develop RHD than those who were single (AOR= 0.204, 95% CI: 0.44-0.936) at p-value 0.041.

Discussion

People from low and middle income are the most affected by RHD. It is considered as a common condition in that region of the world. About 33 million people are living with RHD around the world [12].

The finding of this study shows that the prevalence of RHD among NCDs patients attending NCD clinics at Butaro district hospital is 36.2 percent, which was not similar with several studies done by [13] with the prevalence of 8 percent at Taif city, Ethiopian, and by [14] among patients who were referred for the cardiopathy, with the prevalence of 54.8 percent. The finding of this study is slightly similar (34.0 percent) to study reported in hospital admission [15] [16]

This high prevalence at BDH can be explained by the fact that the patients from Burera district and its district surrounded are referred to BDH instead of being referred to the referral hospitals in Kigali. Others reason should be that PIH/IMB with collaboration with the MoH provides a cardiologist for every month for consultation and for surgery if necessary. Different studies with

raised prevalence of RHD is because the majority of the participants were selected among NCDs or among cardiovascular disease patients.

The finding showed that there is a significant difference females compared to males, females are more likely to develop the RHD than males. In contrast the study done in Taif city among cardiac patient [13] revealed that there is a no significant difference between females and males. This may be explained by the fact that majority of the participant in the study was females. According to study done in Bangladesh, in many populations, ARF and RHD are more common in females than males [2]. They increased exposure to group A streptococcus because of greater involvement of women in child rearing, or reduced access to preventive medical care for girls and women is unclear.

The finding of this study showed that there is an increased risk of developing RHD among unemployed, in line with this finding, the study done by [7] in Uganda revealed that unemployment status was significantly associated with RHD. This can be explained by the fact that most people living in rural area are in the informal sector, making it difficult to ascertain their actual level of income. Furthermore, in developing countries, income is generally low across the board, and a threshold might not have been reached where difference in social classes leads to a difference in disease risk factors.

The finding of this study showed that the sleeping of the floor was found to be significantly associated with a high risk to develop RHD. In the study done in Aceh province in 2020, revealed factor that worsened the spread of RHD was significantly correlated to the time interacted with the environment [17]. A study in Bangladesh has investigated association of socioeconomic status and nutritional status with the risk of rheumatic fever and RHD [4]. Authors concluded that Rheumatic fever and RHD was significantly associated with low income, poor living conditions and poor nutritional status in terms of low height-for-age [18].

In addition, it has been shown that Acute Rheumatic Fever and RHD are more prevalent in rural and remote areas as well as in urban slums, but this likely reflects other risk factors, such as greater household crowding due to low socioeconomic status or limited access to medical resources. There is also a potential link between insufficient nutrition in childhood and susceptibility to Acute Rheumatic Fever, however, it is unclear whether this occurs because insufficient nutrition can increase susceptibility to developing aggressive autoimmune responses to the *S. pyogenes* infection, or because poor nutrition is connected to household overcrowding

and other factors associated with poverty that increases susceptibility to *S. pyogenes* infections [19] [17].

The finding of this study showed that water supplied from the surface was significantly associated with the development of RHD. General poor condition or standard of housing was associated with increased risk of ARF or RHD. Home dampness was associated with ARF. There were no clear trends among other specific housing characteristics and facilities (e.g. electricity, kitchen facilities, light, potable water, sewerage, and ventilation) and Group A Streptococcus (GAS) infection or ARF/RHD [20]. However, in some high-income countries, there are population groups that live in poverty and have high rates of ARF and RHD, including the Indigenous populations of northern and central Australia and New Zealand [21].

The finding of this study showed that no brushing after meal and no brushing at all was appeared significantly associated to with the occurrence of RHD. In contrast with the finding of the study, research done in Kinshasa [22] revealed that brushing habit after meal was not significantly associated with RHD. It is exerted a protective effect against rheumatic fever. The research done by [23] revealed that oral hygiene is essential to decrease the risk of rheumatic fever and RHD occurrence. Poor oral hygiene possibly perpetuates streptococcal infection leading to RF, non-association of oral hygiene practice with RHD risk indicates that the pathogenesis of RHD following RF is probably independent of streptococcal infection.

The study showed that being married or separated/Divorced partner was the protective factors.

Conclusion

Out of 384 respondents, the prevalence of RHD was 36.2%. The occurrence of RHD was associated with gender, size of the family, water supply, sleeping area, regular brushing teeth after meal and wake up. The occurrence of RHD was associated with having recurrent sore throat including fever and having joint pain on knees, ankles both with fever.

Acknowledgement

The authors would like to thank all the study participant for given consents prior to sample collection. They would like to express their appreciation to the management of Butaro Hospital for their assistance.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict of interest

The authors declare that they have no competing interests.

Author's contributions

CM designed the study, collected data and writes a manuscript. JBM analyzed, interpreted the data. ER and JO supervised the study, contributed to data analysis and manuscript writing. All authors read and approved the final manuscript.

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