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The Biosocial Burden of HIV and Malaria Co-infection Among Pregnant Mothers

Adeoti Olatunde[1, 2, *], Adedoja Sulaimon[1]

[1]Department of Science Laboratory Technology, Faculty of Science, The Oke-Ogun Polytechnic, Saki, Nigeria

[2]Cellular Parasitology Programme, Department of Zoology, Faculty of Science, University of Ibadan, Ibadan, Nigeria

Email address:

txy23m@yahoo.com (A. Olatunde)

[*]Corresponding author

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Abstract: Malaria and HIV/AIDS; exacerbated by poverty affects the poorest segments of the population by making them more vulnerable to infections due to lack of access to basic socio-economic needs. This study aimed at investigating the relationship between biosocial indices in relation to co-infection of HIV and malaria among participants. One hundred and forty-nine respondents were interviewed and administered with well-structured questionnaires. After informed consent, their venipunture blood samples were subjected to HIV and Malaria parasite screening by using standard protocols. All data obtained were transcribed and subjected to appropriate statistical analysis. Of the (149) mothers recruited, 32.9% (49/149) were primigravidae while 27.5% (41/149) had more than one previous pregnancy (secungravidae). Respondents with Primary education were 53(35%), 9(19.5%) Secondary while 3(26.2%) had no formal education. Fractions of 12.8% were government employees, 29.5% were self-employed, 2% were un-employed while 49.0% were of other categories. The household size of the respondents ranged from 78.2% with less than 5 members and 21.3% with more than 5 household members. Majority were of no salaried income status whereas the lowest percentage of 2.9% belongs to high income status. There was no statistically significant relationship between socioeconomic indices and prevalence of both HIV and malaria in pregnancy.

Keywords: Bio-Socio-Demographic, Multigravidae, Socio-Economic Status, Secundigravidae, Primigravidae, *Parasitemia*, *Co-Infection*

1. Introduction

According to the world malaria report of 2010 more than 225 million cases of malaria and an estimated 781, 000 deaths occurred in 2009 [23]. Most malaria deaths occurred among African children where a child dies every 45 seconds as a result of malaria [24] preventable cause. In the year 2012, malaria caused more than 627, 000 deaths, mostly among children [25]. Nigeria accounts for a quarter of all malaria cases in the 45 malaria-endemic countries in Africa, [23] where 11% of maternal mortality are as a result of malaria [10] infection, ranging from 19.7% to 72.0% [19, 3, 13, 22]. The persistently high maternal mortality in Africa, Nigeria inclusive, may be associated with increasing numbers of HIV-associated death [21]. HIV was among the major causes of death among women in the reproductive age [20]. The epidemiology of HIV infection had changed and clinical evolution turned a fatal disease to a treatable chronic infection with an improved quality of life and a reduction of morbidity and mortality [21]. In 2010, it was estimated that people living with HIV infection were 34 million, 2.7 million people became newly infected in the same year and HIV related deaths were 1.8 million, including 250 000 children [23]. However, there is a critical overlap between HIV and malaria two infections which posed a great threat for public health [1, 25]. Both diseases are concentrated in tropical and sub-tropical regions of the world, particularly in sub-Saharan Africa. Also, socio-economically, Malaria and HIV/AIDS are worsened by poverty which increases the vulnerability of the poorest segments of a population.

2. Materials and Methods

Saki is a rapidly growing peri-urban border town of over 187,000 inhabitants, located some one hundred and sixty-five kilometers from Ibadan, the Oyo state capital. The town has three secondary Health Care centers with more than thirty other primary and private health clinics. Notably, the HIV sero-prevalence of the town made it source of focus for health intervention programmes. The poor health seeking behaviour has greatly affected pregnant women seeking ante-natal services. Seven Hospitals were selected based on the pilot study that suggested the selected hospitals as the seven best clinical services. Using stratified random selection, one hundred and forty-nine respondents were interviewed, tape-recorded and administered with well-structured questionnaires. In order to complement this non-medical data collection, informed consent was sought from all the respondents before venipunture blood samples were collected which were later subjected to HIV and Malaria parasite screening by using the standard national protocol for serial HIV screening. The questionnaire was structured to obtain demographic, socio-economic status, bio-social information section. Both medical and the non-medical data obtained were transcribed and subjected to appropriate statistical analysis. Infection status was obtained through ANOVA and test of significance (Chi-square) method was used to relate infectious status and bio-socio parameters.

3. Results

Respondents who had primary education accounted for 53(35%), whereas 9(19.5%) had secondary and 3(26.2%) did not attend any formal school (Figure 2). It was observed that among the respondents, 49 were primigravidae, 41(27.5%) and 59(39.6%) were secungravidae and multigravidae respectively. The household size of less than 5 members was 78.2% and 21.3% had more than 5 members (Figure 5). The average number of respondents who earn more than twenty thousand naira (>N20, 000 per month was 2.9% (Figure 1). However, 12.8% of the respondents were governments' employees while 29.5% were self-employed (Figure 4). Among all the respondents screened 45 had neither HIV nor malaria infection (Figure 3).

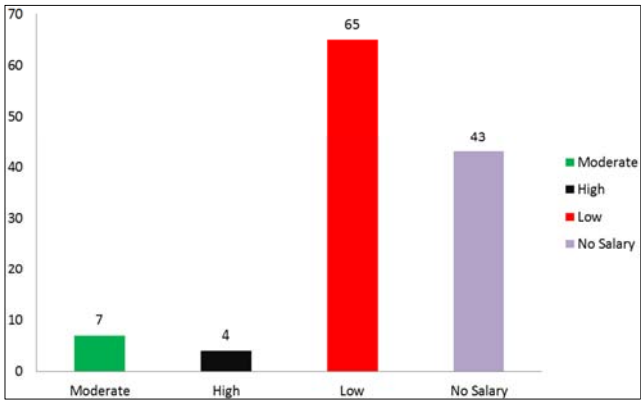

Figure 1. *Monthly Income status of respondents.*

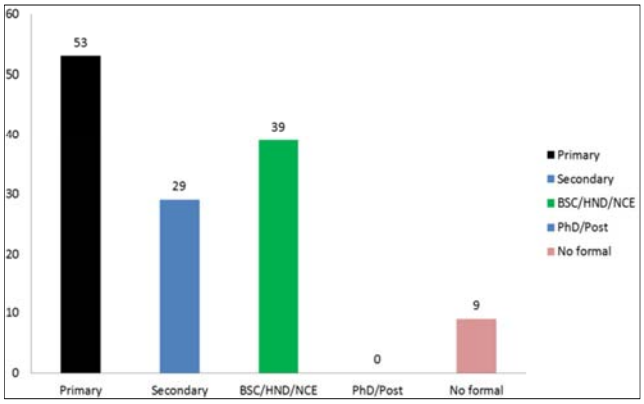

Figure 2. *Highest literacy level of respondents.*

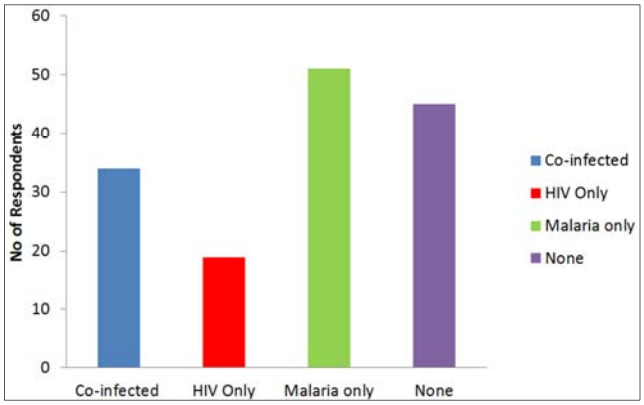

Figure 3. *Infection categories of respondents.*

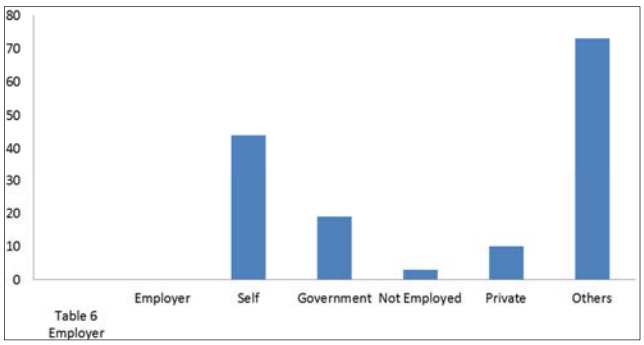

Figure 4. *Category of Employers of respondents.*

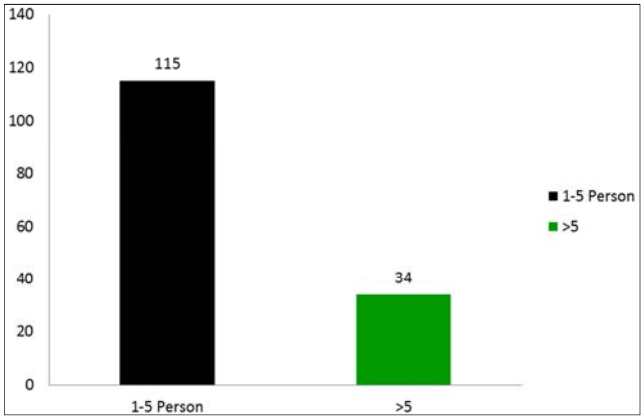

Figure 5. *Household Size of respondents.*

Table 1. *Prevalence of P. falciparum among the participating pregnant women in relation to age group.*

Malaria Status				$\chi^2 = 5.351$
Age Group	**Negative (%)**	**Positive (%)**	**Total (%)**	**p-values**
15 – 19	2 (3.3)	0(0.0)	2(1.4)	
20 - 24	15(24.6)	31(36.9)	46(31.7)	
25 – 29	26(42.6)	28(33.3)	54(37.2)	0.253
30 – 34	13(21.3)	17(20.2)	30(20.7)	
35 - 39	5(8.2)	8(9.5)	13(9.0)	
Total	61(100.0)	82(100.0)	145(100.0)	

$\chi^2 = 5.351$, p = 0.253, Not significant associations

Table 2. *Prevalence of HIV among the participating pregnant women in relation to age group.*

HIV Status				$\chi^2 = 2.468$
Age group	**Negative (%)**	**Positive (%)**	**Total (%)**	**p-values**
15-19	1(1.1)	1 (1.9)	2 (1.4)	
20-24	28 (30.4)	18 (34.0)	46(31.7)	
25-29	39 (42.4)	15 (28.3)	54(37.2)	0.330
30-34	15 (16.3)	15 (28.3)	30(20.7)	
Total	92 (100.0)	53 (100.0)	145 (100.0)	

$\chi^2 = 4.607$, p = 0.330, not significant associations

Table 3. *Prevalence of P. falciparum malaria and HIV status in relation to participants' educational status.*

Infection status				
Literacy level	**Malaria status (%)**		**HIV status (%)**	
	Negative	**positive**	**negative**	**positive**
First school	32(38.6)	21(35.0)	32(35.2)	21(40.4)
SSCE	19(22.9)	10(16.7)	18(19.8)	11(21.2)
BSc/HND/NCE	22(26.5)	17(28.3)	29(31.9)	10(19.2)
PhD/Post	0(0.0)	0(0.0)	0 (0.0)	0(0.0)
No formal	10(12.0)	12(20.0)	12(13.2)	10(19.2)
Total	83(100.0)	60(100.0)	91(100.0)	52(100.0

Malaria: $\chi^2 = 2.468$, p= 0.650; HIV: $\chi^2 = 6.099$, p= 0.192. Not significant associations

Table 4. *Prevalence of P. falciparum malaria and HIV status in relation to participants' employer.*

Infection status				
Employer	**Malaria status (%)**		**HIV status (%)**	
	Negative	**positive**	**negative**	**positive**
Self	22(35.5)	22(25.9)	27(28.7)	17(32.1)
Govt	9(14.5)	10(11.8)	16(17.0)	3(5.7)
Others	4(6.5)	6(7.1)	7(74)	3(5.7)
Not employed	27(33.5)	47(55.3)	44(46.8)	30(56.6)
Total	62(100.0)	55(100.0)	94(100.0)	53(100.0)

Malaria: $\chi^2 = 4.421$; p = 0.352, HIV: $\chi^2 = 6.546$, p = 0.162, Not significant associations

Table 5. *Prevalence of P. falciparum malaria and HIV status in relation to participants' household size.*

Infection status				
Household size	**Malaria status (%)**		**HIV status (%)**	
	Negative	**positive**	**negative**	**positive**
1-5	46(76.7)	69(84.1)	78(83.9)	37(75.5)
>5	14(23.3)	13(15.9)	15(16.1)	12(24.5)
Total	60(100.0)	82(100.0)	93(100.0)	49(100.0

Malaria: $\chi^2 = 1.137$; p = 0.286, HIV: $\chi^2 = 0$, p = 0.415. Not significant associations

Table 6. *Prevalence of P. falciparum malaria and HIV status in relation to income status.*

Infection status				
Income	**Malaria status (%)**		**HIV status (%)**	
	Negative	**Positive**	**negative**	**positive**
Moderate	2(3.6)	5(7.8)	5(5.7)	2(6.7)
High	2(3.6)	2(3.1)	2(2.3)	2(6.5)
Low	29(52.7)	36(56.3)	51(58.0)	14(45.2)
No income	22(40.0)	21(32.8)	30(41.9)	13(41.9)
Total	55(100.0)	64(100.0)	88(100.0)	31(100.0)

Malaria: $\chi^2 = 2.302$; p = 0.512, HIV: $\chi^2 = 6.546$; p= 0.162. Not significant associations

4. Discussion

This study was in conformity with the study of [25] which documented general characteristics of pregnant mothers and related some selected characteristics with the prevalence of malaria during pregnancy. The present study showed that there was no statistically significant relationship between socioeconomic indices and transmission (prevalence) of co-infection of HIV and malaria in pregnancy. However, there was a significant association between mono- HIV and respondents' socio-economic status [8].

The prevalence rate of 55.3% and 56.6% of malaria and HIV respectively among unemployed women which was similar to several studies which evaluated the relationship between socioeconomic status by assessing the economic taste of respondents who were infected by both HIV and malaria [9, 4]. The observed prevalence of Malaria and HIV infection among women with fewer household (1-5 members) could not be substantiated from the literature although there were evidence that Wealth Index (calculated by Income divided by the number of household) increases with fewer household [8].

It is expected that high prevalence of malaria and HIV should be observed among pregnant women who were from higher household (low economic well-being). Similarly, the result was in consonance with the report from African country which established a direct relationship between economic well-being, the risk of HIV infection. In other words; the wealthier a man is, the more likely he engages in multiple sex partners thereby increasing his chances of HIV infection [12].

This study it was observed that among low income and no-income earners in the sampled population harboured the highest prevalence of *falciparum* malaria. Although, this supported the long standing reports establishing that malaria is not only a disease of poverty but a cause of poverty [11, 24]. The prevalence of *P. falciparum* infection rate observed in this study may be due to several factors characteristic of the study area such as lack of proper sanitation and peak of malaria transmission. This study further supported malaria as disease of public health importance and this could be complicated by lack of quality antenatal services, poor service delivery; all of which are burden of malaria infection [18, 25].

The HIV sero-prevalence was also high among the low and no-income earners (Table 6), giving credence to the belief that women in rural areas are more susceptible to HIV infection because they often have limited employment choices, making them prey with far less financially secure than men, with earnings of 18% of the typical salary of a man [4]. The HIV prevalence was highest among women with primary education, and moderately high among women with secondary education (Table 3); this is similar to the result of the sentinel study conducted in 2010 in Nigeria [10] where the highest HIV prevalence was documented among women with primary and secondary education and the least was observed among those with Islamic educational background. However, there was no statistically significant relationship between gravidity, gestational age and infection status in consonance with earlier reports. [10], however established a strong association between gravidity and prevalence of malaria in pregnancy. Generally, in agreement with [5, 7], there was no difference in socio-economic and demographic factors for HIV and malaria [8]. However, in contrast to earlier works there was no significant association between age of respondents and the two infections investigated among pregnant mothers [6] indicating a slow acquisition of active immunity, thereby suggesting that older adults might have lost some degree of immunity to confront certain ailments. The pattern of malaria prevalence among rural and urban dwellers varies [16, 26] and the co-infection rate in urban Ibadan and Saki is expected to vary depending on several behavioral and socio economic factors [7].

5. Conclusion

There seem to be no-significant relationship between biosocial indices and the rate or prevalence of HIV and *falciparum* malaria infection among the respondents.

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