



Research Paper

Studies on Socioeconomic Factors Affecting Malarial Infection and Pathogenic Microbiota in the Reproductive Tract of Pregnant Women in Orlu, Imo State, Nigeria

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Abstract

<p>Background: Socioeconomic factors influence the vulnerability of women to infection with malaria and reproductive tract infections (RTI) either singly or in concomitance with one another. However, no studies have been carried out to examine independent associations between these factors and malaria and other pathogenic infections during pregnancy in the reproductive tract of women in the study area.</p> <p>Methods: After collecting their biodata, a trained health worker collects vaginal swabs from women taking part in the study by placing dry cotton sticks in their vaginal canal for a few seconds. These swabs were then rolled onto a slide and diagnosed for BV. To detect <i>N. gonorrhoea</i>, <i>C. trachomatis</i>, <i>T. vaginalis</i>, and other RTIs, Dacron was used in collecting cervico-vaginal samples for PCR tests. A sample from each participant was carefully labelled and stored at -20° C for some hours before extraction, carried out within a day Using 10% Giemsa, malaria diagnosis was done using the thick and thin method. Educational attainment was classified into primary, secondary, and tertiary education, while economic status was established based on a family's monthly income into low, middle, and high income earners.</p> <p>Results: Out of the 200 pregnant women that participated in the study, a total of 104 (52%) were singly or concurrently infected with malaria and reproductive tract infections, among whom 28 (26.9%) were within the age bracket of 18 and 24 years. 49 (47.1%) and 25 (24%), respectively, were aged 25 to 34 years and 35 to 44 years. Two participants were aged 45 years and older. Among the 104 participants with malaria and RTIs, a total of 102 (98%) were married, while 2 were widows. 18 (17.3%) had primary school education, while 82 (78.8%) and 4 (3.8%) attained secondary and tertiary education, respectively. The majority of them, 97 (93.3%), were low-income earners, while 7 (6.7%) belonged to the middle income category.</p> <p>Conclusion: The level of education and income status affect the prevalence of malaria and its co-infection with reproductive tract infections, both in pregnant and non-pregnant women. Improving women's educational and economic wellbeing is imperative to improving risk awareness, thereby reducing and preventing malaria and RTI infections among women generally.</p>	<p>Manuscript Information</p>
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Keywords: Socioeconomic, Concomitant, Malarial, Pathogenic, Microbiota, Reproductive Tract, Pregnant Women

Introduction:

Malaria and reproductive tract infections (RTI) are leading worldwide public health concerns. Globally, there are about 500 million new RTI cases diagnosed annually. With preponderance in the infections more in women, by up to five times, compared to the men.^[1, 2] RTIs are a leading cause of complications among pregnant women, including infertility and adverse pregnancy outcomes.^[3,4,5] In Saharan African countries, education and poverty are key malaria and RTI determinants.^[6] Due to factors like lack of money, gender inequality, and cultural and religious beliefs, women encounter serious challenges in getting an education.^[7] Enrollment in school can delay sexual debut and the age of marriage among young women^[8], both of which are RTI risk factors in terms of RTI awareness and vulnerability.^[9] Education enhances consciousness about risky sexual conduct because it gives access to health promotion information leading to safer sexual practises^[10, 11]. Due to economic considerations, women are likely to engage in risky sexual practises as a source of income or live in overcrowded and dirty environments that aid malaria transmission, which increases RTI and malaria risk.^[12] For similar reasons, women that financially depend on male partners are more likely to condone the risky sexual conduct of their partners because they do not have the wherewithal to live alone if they separate from such partners^[13]. Education and poverty can act as separate or joint factors that influence susceptibility to malaria and reproductive tract infections^[14]. There are few studies that have assessed the exclusive associations of these socioeconomic variables with malaria and RTIs among pregnant women. It is vital to know which socioeconomic factors are most influential on malaria and reproductive tract infections among pregnant women in order to appropriately target measures aimed at addressing them.

Materials and Methods:

1. Data and sample collection

After collecting their biodata, a trained health worker collects vaginal swabs from women taking part in the study by placing dry cotton sticks in their vaginal canal for a few seconds. These swabs were then rolled onto a slide and diagnosed for BV. To detect *N. gonorrhoea*, *C. trachomatis*, and *T. vaginalis*, Dacron was used in collecting cervico vaginal samples for PCR tests. A sample from each participant was carefully labelled and stored at -20°C for some hours before extraction, which was carried out within a day. Samples collected and investigated from sick, non pregnant women served as controls. Educational attainment was classified into primary, secondary, and tertiary education, while economic status was established based on a family's monthly income into low, middle, and high income earners.

2. Malaria diagnosis by microscopy

The thick-and thin method was used for malaria diagnosis. To determine the parasite density, 8000 white blood cells were assumed in each µl and then determining the number of parasites in a given 200 white blood cells.

3. Detection of Bacterial Vaginosis using Microscopy

Using safranin for Gramme staining, bacterial vaginosis was diagnosed in the vaginal swab samples. Nugent criteria were used to classify and record the obtained results in appropriate forms.

4. Result

Out of the 200 women that participated in the study, a total of 104 (52%) were singly or concurrently infected with malaria and reproductive tract infections, among whom 28 (26.9%) were within the age bracket of 18 and 24 years. 49 (47.1%) and 25 (24%), respectively, were aged 25 to 34 years and 35 to 44 years. Two participants were aged 45 years and older.

Among the 104 participants with malaria and RTIs, a total of 102 (98%) were married, while 2 were widows. 18 (17.3%) had primary school education, while 82 (78.8%) and 4 (3.8%) attained secondary and tertiary education, respectively. The majority of them, 97 (93.3%), were low income earners, while 7 (6.7%) belonged to the middle income category. The majority of the participants with co-infections of malaria and reproductive tract infections were within the age bracket of 25 and 34 years. 4 persons with malaria and B.V., 3 persons with malaria and *trichomoniasis*, and 3 persons also with malaria and gonorrhoea. With regards to education status, most of the co-infections were observed in participants with primary education. 5 out of the 6 that had malaria and B.V. co-infection, and 6 out of the 8 with malaria and *gonorrhoea* had primary education. There was a significant difference in the prevalence of malaria and its co-infection with RTIs among married / pregnant women and their non-pregnant and possibly married counterparts, with the former having a prevalence of 11% while the latter had a prevalence of 5%.

Among the non-pregnant women, prevalence appeared to be concentrated more among low-income, single women with primary education. A similar trend was observed among the pregnant women. In general, it could be inferred that level of education and income status affect the prevalence of malaria and its coinfection with reproductive tract infections, both in pregnant and non-pregnant women.

Table: 1 Distribution of Reproductive Tract Infections according to Socio economic characteristics of the study population

Parameter	Pregnant Attendees										Non pregnant Attendees											
	All N=200	Bacterial vaginosis		Trichomonias is		Chlamydia		Gonorrhoe a		Syphilis		All N=60	Bacterial vaginosis		Tricho- moniasis		Chlamydia		Gonorrhoe ea		Syphilis	
		-ve	+ve	-ve	+ve	-ve	+ve	-ve	+ve	-ve	+ve		-ve	+ve	-ve	+ve	-ve	+ve	-ve	+ve	-ve	+ve
Age																						
18-24	45	37	8	41	4	45	-	39	6	45	-	18	18	-	18	-	18	-	16	2	18	-
25-34	96	90	6	92	4	96	-	92	4	94	2	32	32	-	32	-	32	-	32	-	31	1
35-44	56	52	4	56	-	55	1	54	2	54	2	12	12	-	12	-	12	-	12	-	12	-
45-above	3	3	-	3	-	3	-	3	-	3	1	8	8	-	8	-	8	-	8	-	8	-
Marital Status																						
Single	-	-	-	-	-	-	-	-	-	-	-	22	22	-	22	-	22	-	21	1	22	-
Married	198	180	18	190	8	197	1	187	10	194	4	34	34	-	34	-	34	-	33	1	34	-
Widow/Divd	2	2	-	2	-	2	-	11	1	2	-	4	4	-	4	-	4	-	4	-	3	1
Education																						
Primary	36	26	10	31	5	35	1	28	8	33	3	34	34	-	34	-	34	-	32	2	34	-
Secondary	142	134	8	139	3	142	-	138	4	141	1	21	21	-	21	-	21	-	21	-	20	1
Tertiary	22	22	-	22	-	22	-	4	22	22	-	5	5	-	5	-	5	-	5	-	5	-
Economic Status																						
Low Income	158	146	12	150	8	158	-	149	9	154	4	48	48	-	48	-	48	-	46	2	47	1
Middle Income	42	36	6	42	-	41	1	9	39	42	0	12	12	-	12	-	12	-	12	-	12	-
High Income	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table: 2 Distribution of Malaria and Coinfection of Malaria with Reproductive Tract Infections according to Socio economic characteristics of the study population

Parameter	Pregnant Attendees										Non pregnant Attendees											
	All N=10 4 N (%)	Malaria and Bacterial vaginosis		Malaria and Trichomoniasis		Malaria and Chlamydia		Malaria and Gonorrhoea		Malaria and Syphilis		All N=54 n= %)	Bacterial vaginosis		Trichom oniasis		Chlamydia		Gonorrhoea		Syphilis	
		98 -ve	6 +ve	100 -ve	4 +ve	104 -ve	0 +ve	96 -ve	8 +ve	100 -ve	4 +ve		54 -ve	0 +ve	54 -ve	0 +ve	54 -ve	0 +ve	52 -ve	2 +ve	53 -ve	1 +ve
Age																						
18-24	28	27	1	27	1	28	-	25	3	27	1	8	8	-	8	-	8	-	7	1	8	-
25-34	49	45	4	46	3	49	0	46	3	48	1	29	29	-	29	-	29	-	29	-	29	-
35-44	25	24	1	25	-	25	0	23	2	24	1	11	11	-	11	-	11	-	10	1	11	-
45-above	2	2	-	2	-	2	-	2	-	1	1	6	6	-	6	-	6	-	6	-	5	1
Marital Status																						
Single	-	-	-	-	-	-	-	-	-	-	-	20	20	-	20	-	20	-	18	2	19	-
Married	102	97	5	98	4	1020		95	7	98	4	33	33	-	33	-	33	-	33	-	1	
Widow/Divd	2	1	1	2	-	2	-	1	1	2	-	1	1	-	1	-	1	-	1	-	33	-
Education																						
Primary	18	13	5	16	2	18	-	12	6	15	3	30	30	-	30	-	30	-	28	2	30	-
Secondary	82	81	1	80	2	82	-	80	2	81	1	20	20	-	20	-	20	-	20	-	19	
Tertiary	4	22	-	4	-	4	-	4	-	4	-	4	4	-	4	-	4	-	4	-	1	
																					4	-
Economic Status																						
Low Income	97	93	4	93	4	97	-	90	7	93	4	48	48	-	48	-	48	-	46	2	47	
Middle Income	7	32	2	7	-	7		5	2	7	0	6	6	-	6	-	6	-	6	-	1	
High Income	-	-	-	-	-	-		-	-	-		-	-	-	-	-	-	-	-	-	6	
																					-	-

Discussion

In this study, the majority of the participants were low-income earners with low educational and economic status. Women with tertiary education reported a lesser incidence of malaria and reproductive tract infections than women aged 34 years and older. Our findings imply that low education and income status are distinctively associated with malaria and RTI infection in women generally, whether pregnant or not, which is in agreement with previous studies on the impacts of socioeconomic factors on reproductive tract infections in women.^[15, 16, 17] as well as studies on the effects of education and poverty^[17, 16]

Conclusion

In addition to the importance of enhancing the education and economic well-being of women for primary prevention of malaria and RTIs, findings in this study underline the critical need for secondary prevention by way of regular RTI screening among pregnant women in the study area.

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Declaration on Conflict of Interest

The authors declare that there was no conflict of interest concerning this research work.

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