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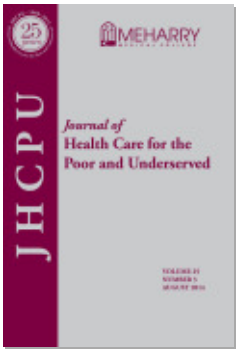

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Influence of Education on HIV Infection among Pregnant Women Attending their Antenatal Care in Sekondi-Takoradi Metropolis, Ghana

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Abstract: This study investigated the influence of the level of education on HIV infection among pregnant women attending antenatal care in Sekondi-Takoradi, Ghana. A cross-sectional study was conducted at four hospitals in the Sekondi-Takoradi metropolis. The study group comprised 885 consenting pregnant women attending antenatal care clinics. Questionnaires were administered and venous blood samples were screened for HIV and other parameters. Multivariable logistic regression analyses were performed to determine the association between the level of education attained by the pregnant women and their HIV statuses. The data showed that 9.83% (87/885) of the pregnant women were HIV seropositive while 90.17% (798/885) were HIV seronegative. There were significant differences in mean age (years) between the HIV seropositive women (27.45 ± 5.5) and their HIV seronegative (26.02 ± 5.6) counterparts (p = .026) but the inference disappeared after adjustment (p = .22). Multivariable logistic regression analysis revealed that pregnant women with secondary/tertiary education were less likely to have HIV infection compared with those with none/primary education (adjusted OR, 0.53; 95% CI, 0.30–0.91; p = .022). Our data showed an

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association with higher level of education and HIV statuses of the pregnant women. It is imperative to encourage formal education among pregnant women in this region.

Key words: HIV, formal education, Ghana, risk factor, prevention, pregnant women.

Human immunodeficiency virus (HIV) is a lentivirus that causes acquired immunodeficiency syndrome (AIDS).[1] Globally, there are about 34.0 million (31.4 million–35.9 million) people living with HIV in 2011; 2.5 million people were newly infected with HIV and sub-Saharan Africa accounts for about 69% of all people living with HIV worldwide.[2] In Ghana, HIV prevalence varies according to gender, age, sexual behaviour, geographic area and urban-rural residence.[3] HIV prevalence was 1.9% in the adult population while it was 2.9% among pregnant women (aged 15–49 years).[4] Women's vulnerability to HIV infection especially in Ghana may be influenced by gender, unequal power relationships, poverty, few vocational skills, and limited education.[5]

However, formal education has been tagged a "social vaccine to HIV/AIDS,"[6,7] and higher education has multiple effects on individuals ranging from the acquisition of facts and cognitive enhancement to greater social status, longer life expectancy, general intelligence, more use of health services, fewer negative health outcomes, prestigious occupations, and better health behaviours and outcomes.[8,9] Evidence suggests that education teaches one to think, imparting cognitive and decision-making abilities necessary for improving one's health,[10] and that these enhanced abilities increase with schooling.[11]

Preventive education is often acknowledged as the principal means of reducing the rate of new HIV infections,[12] but the quest for improved education among the general populace in countries such as Ghana remains formidable. The 1992 Constitution of Ghana among other things stated that basic education will be free, compulsory, and available to all.[13] Yet there are lots of financial impediments for poor households in sending their families to school, especially the high cost of tuition fees, clothing, foods, and other community levies.[14] Interestingly, high cost of tuition is often cited as the most frequent reason for non-attendance and non-enrollment in schools. Previous research showed that health education has a positive effect on preventing mother-to-child transmission of HIV,[15] and formal education has been associated with increased level of awareness and the need for HIV testing among people.[16] In addition, pregnant women with low educational levels, low-incomes, and more than one partner were more likely than their counterparts not to know their HIV statuses.[17,18] Furthermore, maximizing school attendance was associated with lower risk of sexual behaviours among young people.[19]

Ghana's AIDS Commission acknowledges that the level of HIV awareness in Ghana is almost 98% but this has not been translated into a comprehensive knowledge and appropriate behaviour as people have low perception of the risk of HIV infection.[3] Similarly, studies have shown that educational interventions in Ghana have not effectively demystified beliefs about the origin, causes, and transmission of HIV/AIDS.[20,21] In a related study in Accra, students' HIV knowledge was good but their HIV testing was low.[22] In this study, we investigated the association of the levels of education attained by the pregnant women attending their antenatal care clinics with their HIV statuses.

Methods

The study took place in Sekondi-Takoradi metropolis, Ghana. Pregnant women attending their antenatal care clinics at Effia-Nkwanta Regional Hospital, Takoradi and Esikado Hospitals and Jemima Hospital were conscripted for the study. Details of the study design and population have been published elsewhere.[23] Briefly, this cross-sectional study was carried out between January and October, 2010 with consenting pregnant women attending antenatal care. Each facility was visited once a week during their routine antenatal care visits. Written informed consents were obtained from the pregnant women and ethical clearance was obtained from the Ghana Health Service Research Ethical Review Committee, Accra.

Five mls of blood were collected by a well-trained laboratory technician from the median cubital vein. The blood samples were collected in EDTA bottle and transported to the laboratory for same day analysis and storage. HIV screening for the pregnant women were performed and statuses of the women were obtained from the preventing mother-to-child transmission (PMTC) clinic. The sero-statuses were determined by applying the national diagnostic algorithm of two rapid antibody tests and western blot confirmation while indeterminate cases were confirmed at the public health reference laboratory at Effia-Nkwanta Regional Hospital.

Socio-demographic characteristics were analysed by Pearson chi-squared test (χ^2) and ANOVA for the comparison of mean. Univariable and multivariable logistic regression models were used to identify the association with HIV statuses and the levels of education attained after adjusting for confounding factors. To improve precision and maximise sample size, we merged pregnant women with no education with primary education and also secondary education with tertiary education using no education/primary as the reference in the multivariable logistic regression analysis. Confounding was considered based on biological plausibility and a +/− 10% change in odds ratio (OR) estimate. The final parsimonious multivariable model was selected after regression assumptions, confounding, and the results of univariable analysis. OR and 95% confidence interval (CI) were used to measure the strength of the associations. All tests were two-tailed and statistical significance was defined as $p < .05$. Data were analysed using IBM SPSS Statistics version 21.0 (IBM Corporation, Armonk, NY, USA).

Results

A total of eight hundred and eighty five (885) pregnant women were recruited for this study. Table 1 shows the general characteristics of the pregnant women with HIV status. Overall, 9.83% (87/885) were HIV seropositive while 90.17% (798/885) were HIV seronegative. There were significant differences in mean age of the HIV positive women (27.45 years ± 5.5) versus their HIV negative (26.02 years ± 5.6) counterparts. The median age of the HIV positive was 28 years (range, 15–39) while that of HIV negative was 25 years (range, 15–46). There were no differences with gravidae, occupation and trimester of the pregnant women with HIV infection. However, there were significant differences with HIV infection and the levels of education attained (Table 1).

Table 2 shows the multivariable logistic regression analysis of the risk of HIV with

Table 1.

CHARACTERISTICS OF THE PREGNANT WOMEN WITH HIV STATUS

Characteristics	HIV negative n = 798 (%)	HIV positive n = 87 (%)	p value[a]
Age (years)			
Mean ± SD	26.02 ± 5.6	27.45 ± 5.5	.026
Age group (years)			
≤19	12.7	9.3	
20–29	61	54.7	.071
30–39	24.4	36	
≥40	1.9	0	
Level of education attained			
None	18.4	30.2	
Primary	14.2	17.4	.030
Secondary	63.2	50	
Tertiary	4.2	2.3	
Gravidae			
Primigravidae	60.2	49.4	
Secundigravidae	31.6	35.6	.053
Multigravidae	8.2	14.9	
Occupation			
Civil service	2.3	1.4	
Farmer/Trader/Caterer/ Fishing	95.2	97.2	.756
Teacher/Student	2.5	1.4	
Trimester			
1st trimester	21.6	24.4	
2nd trimester	65.6	57	.215
3rd trimester	12.8	18.6	

[a]p-values derived from Pearson chi-square test for categorical variables and ANOVA for the mean of continuous variable.

education. In univariable analysis, differences were found with age and primigravidae but disappeared after adjustment signifying confounding factors. In order to improve precision and maximise power, we also examined the association with the levels of education of the pregnant women attained by modelling the levels of education into two categories; (a) none/primary education, and (b) secondary/tertiary education. Our data indicated that pregnant women with secondary/tertiary education were less likely to have HIV infection. The unadjusted OR was 0.53 (95% CI, 0.34–0.83; p = .006) (Table 2). This inference remained significant after adjusting for age, adolescence versus adult, gravidae, occupation, parasitic diseases, co-infection, and area of residence as potential

Table 2.

MULTIVARIABLE LOGISTIC REGRESSION ANALYSIS OF THE RISK OF HIV

Variable	Unadjusted OR (95% CI)	p value	Adjusted OR (95% CI)	p value
Age (Years)	1.05 (1.01–1.09)	.026	1.07 (0.96–1.19)	.22
Age groups (Years)				
≤19	1		1	
20–29	1.22 (0.56–2.67)	.62	1.48 (0.28–7.84)	.64
30–39	2.02 (0.89–4.56)	.091	1.34 (0.15–11.75)	.79
≥40	0.00 (0–0)	.99	0.00 (0–0)	.99
Gravidae				
Primigravidae	0.45 (0.23–0.89)	.021	0.82 (0.42–1.59)	.55
Secundigravidae	0.62 (0.31–1.26)	.19	1.09 (0.42–2.84)	.86
Multigravidae	1		1	
Occupation	0.95 (0.29–3.11)	.93	0.93 (0.25–3.49)	.92
Trimester	1.09 (0.75–1.59)	.66	1.20 (0.77–1.87)	.41
Level of education attained				
None/Primary	1		1	
Secondary/Tertiary	0.53 (0.34–0.83)	.006	0.53 (0.30–0.91)	.022

OR = odds ratio
CI = confidence interval

confounders in the multivariable logistic regression analysis. The adjusted OR was 0.53 (95% CI, 0.30–0.91; p = .022) (Table 2). When secondary/tertiary education was used as the indicator in the multivariable logistic regression analysis, pregnant women with none/primary education were more likely to be HIV positive (adjusted OR, 1.70; 95% CI, 1.05–2.75; p = .031) (data not shown).

Discussion

Results from this study suggest that pregnant women with higher education were less likely to be infected with HIV than those with low level of education. A similar study from Ghana revealed that mother's years of formal education was strongly associated with health knowledge.[9] In addition, previous study indicated that higher education or more years of formal schooling was widely associated with better health but the underlying causes are unclear.[11] As expected, individuals with higher level of education were more likely to practice protected health behaviours (e.g., cognitive and decision-making abilities) but these greater understanding did not influence their HIV/AIDS knowledge.[11] Knowledge is often considered necessary but also insufficient in terms

of behavioural change. The majority of HIV intervention programmes in sub-Saharan Africa are normally built on biomedical and social cognitive models with the supposition that individuals are aware of their sexual risk behaviours. However, though knowledge and awareness of HIV may be high in Ghana, there remain myths and misconceptions about how HIV is transmitted.[21]

Over the years in Ghana, knowledge of preventing HIV/AIDS along with misconception that propagated stigma and discrimination against infected people has varied.[24] While implementation of various HIV prevention and treatment programmes have commenced in Ghana since 2003, uptake of HIV testing is still slow, often attributed to HIV-related stigma.[25] HIV treatment has been recognised as a form of prevention especially in developing countries like Ghana, but that still depends on the uptake for HIV testing which is unfortunately low during pregnancy in developing countries.[26] In a previous study conducted in Ghana, significant negative interaction was found between risky sexual behaviours and community stigma especially among females who live in communities with high levels of stigma.[25] In a related study, majority of Ghanaian women (especially from the rural areas) have not been tested for HIV infection but would want to if provided with the opportunity.[27] Thus, the significance of determining HIV statuses of pregnant women is vital to HIV preventive programme in terms of bridging perinatal transmission as well as counselling. With the low HIV testing observed during pregnancy, World Health Organisation (WHO) encouraged countries to adopt the routine offer of HIV testing also known as an *opt-out* strategy.[28] This approach offers routine voluntary HIV testing to all pregnant women accessing antenatal care, and by this means changing the emphasis from client-initiated voluntary counselling and testing (*opt-in*) to provider counselling and testing with patient's right to refuse test (i.e., to opt out). The strategy has been widely accepted by the majority of pregnant women surveyed in the Wa municipality of Ghana.[29]

HIV preventive education which often happens in formal educational settings is recognised as the primary means of decreasing the rate of new HIV infection and its goal is to prevent infection, reduce stigma and discrimination, change people's attitude towards HIV/AIDS and infected people as well as adoption of lifestyles that will not predispose people to the infection. In a previous study from eastern Ghana, 8% of pregnant women were HIV seropositive.[30] Similarly, a recent Kenyan study indicated that the vast majority of HIV-infected persons were not aware of their HIV status, posing a major hurdle to HIV prevention.[31] In Brazil, pregnant women are at increased risk of HIV infection as they remain sexually active without the use of condom.[32] In United States of America, women who believe that they have no risk of getting HIV were more likely to have less education.[33] In a related study in Kumasi, Ghana, the authors found that low HIV/AIDS knowledge, and non-disclosure of partners HIV status, were associated with inconsistent condom use thereby increasing the risk of HIV and sexually transmitted infections.[34] These evidences showed that empowerment of women through formal education especially in developing countries will not only lead to greater human capital development but also increase their sensitivity and awareness for their health and the health of their unborn children through safer sexual health behaviours and HIV testing.

Conclusion

This study has shown the association between the level of education attained among pregnant women and their HIV statuses. Our study revealed that pregnant women with higher education were less likely to have HIV infection when compared with those with lesser education. It is imperative to encourage formal education among pregnant women especially in the rural regions.

Conflict of interest

The authors declare that they have no conflict of interest.

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Notes

1. Weiss RA. How does HIV cause AIDS? Science. 1993 May 28;260(5112):1273–9. http://dx.doi.org/10.1126/science.8493571
2. World Health Organization (WHO). HIV/AIDS: fact sheet N°360. Geneva, Switzerland: WHO, 2013. Available at: http://wwwwhoint/mediacentre/factsheets/fs360/en/indexhtml.
3. hivpolicy.org. United Nations General Assembly Special Session on HIV/AIDS. Bundoora, Australia: hivpolicy.org, 2008. Available at: http://dataunaidsorg/pub/Report/2008/ghana_2008_country_progress_report_enpdf.
4. Ghana Health Service (GHS). 2009 GHS annual report. Ghana: Ghana Health Service/NACP. 2009.
5. Mill JE, Anarfi JK. HIV risk environment for Ghanaian women: challenges to prevention. Soc Sci Med. 2002 Feb;54(3):325–37. http://dx.doi.org/10.1016/S0277-9536(01)00031-4
6. Kelly MJ. The encounter between HIV/AIDS and education. Harare, Zimbabwe: UNESCO, Sub-Regional Office for Southern Africa, 2000.
7. The World Bank. Education: The social vaccine to HIV/AIDS. Washington, DC: The World Bank, Available at: http://web.worldbank.org/external/LazyURLRedirector?redirectType=content&contentMDK=20129871.
8. Baker DP, Collins JM, Leon J. Risk factor or social vaccine? The historical progression of the role of education in HIV and AIDS infection in sub-Saharan Africa. Prospects. 2008;38:467–86. http://dx.doi.org/10.1007/s11125-009-9097-y
9. Greenaway ES, Leon J, Baker DP. Understanding the association between maternal education and use of health services in Ghana: exploring the role of health knowledge. J Biosoc Sci. 2012 Nov;44(6):733–47. Epub 2012 Mar 1. http://dx.doi.org/10.1017/S0021932012000041
10. Lleras-Muney A. The relationship between education and adult mortality in the United States. Rev Econ Stud. 2005;72(1):189–221. http://dx.doi.org/10.1111/0034-6527.00329
11. Peters E, Baker DP, Dieckmann NF, et al. Explaining the effect of education on health:

a field study in Ghana. Psychol Sci. 2010 Oct;21(10):1369–76. Epub 2010 Aug 25. http://dx.doi.org/10.1177/0956797610381506
12. Gallant M, Maticka-Tyndale E. School-based HIV prevention programmes for African youth. Soc Sci Med. 2004 Apr;58(7):1337–51. http://dx.doi.org/10.1016/S0277-9536(03)00331-9
13. Republic of Ghana. 1992 Constitution of the Republic of Ghana. Netherlands: GhanaWeb, 1992. Available at: http://www.ghanaweb.com/GhanaHomePage/republic/constitution.php.
14. Oduro AD. Basic education in Ghana in the post-reform period. Ghana: Centre for Policy Analysis, 2000. Available at: http://www.cepa.org.gh/researchpapers/BASIC%20EDUCATION.
15. Ugwu GO, Iyoke CA, Nwagbo DF. The impact of health education on the awareness and acceptability of strategies for preventing mother to child transmission of HIV in Enugu, Nigeria. Niger J Med. 2012 Oct–Dec;21:441–4.
16. Onyeabor OS, Iriemenam N, Adekeye OA, et al. The effect of educational attainment on HIV testing on African Americans. J Hhealth Care Poor Underserved. 2013 Aug;24(3):1247–56. http://dx.doi.org/10.1353/hpu.2013.0113
17. Hoque M, Hoque ME. Knowledge of danger signs for major obstetric complications among pregnant KwaZulu-Natal women: implications for health education. Asia Pac J Public Health. 2011 Nov;23(6):946–56. http://dx.doi.org/10.1177/1010539511428698
18. Soares Mde L, de Oliveira MI, Fonseca VM, et al. [Predictors of unawareness of HIV serostatus among women submitted to the rapid HIV test at admittance for delivery]. Cien Saude Colet. 2013 May;18(5):1313–20. http://dx.doi.org/10.1590/S1413-81232013000500016
19. Hargreaves JR, Morison LA, Kim JC, et al. The association between school attendance, HIV infection and sexual behaviour among young people in rural South Africa. J Epidemiol Community Health. 2008 Feb;62(2):113–9. http://dx.doi.org/10.1136/jech.2006.053827
20. Boateng D, Kwapong GD, Agyei-Baffour P. Knowledge, perception about anti-retroviral therapy (ART) and prevention of mother-to-child-transmission (PMTCT) and adherence to ART among HIV positive women in the Ashanti Region, Ghana: a cross-sectional study. BMC Womens Health. 2013 Jan 22;13:2. http://dx.doi.org/10.1186/1472–6874-13-2
21. Tenkorang EY. Myths and misconceptions about HIV transmission in Ghana: what are the drivers? Cult Health Sex. 2013;15(3):296–310. Epub 2012 Dec 14. http://dx.doi.org/10.1080/13691058.2012.752107
22. Oppong Asante K. HIV/AIDS knowledge and uptake of HIV counselling and testing among undergraduate private university students in Accra, Ghana. Reprod Health. 2013 Mar 28;10:17. http://dx.doi.org/10.1186/1742-4755-10-17
23. Orish VN, Onyeabor OS, Boampong JN, et al. The effects of malaria and HIV co-infection on hemoglobin levels among pregnant women in Sekondi-Takoradi, Ghana. Int J Gynaecol Obstet. 2013 Mar;120(3):236–9. Epub 2012 Dec 4. http://dx.doi.org/10.1016/j.ijgo.2012.09.021
24. Amoako-Agyeman KN. Adolescent religiosity and attitudes to HIV and AIDS in Ghana. SAHARA J. 2012 Nov;9(4):227–41. http://dx.doi.org/10.1080/17290376.2012.745665
25. Koku EF. Stigma, sexual risk and desire for HIV tests in Ghana. Sex Health. 2011 Mar;8(1):110–9. http://dx.doi.org/10.1071/SH09095
26. Farmer P, Leandre F, Mukherjee JS, et al. Community- based approaches to HIV

treatment in resource-poor settings. Lancet. 2001 Aug 4;358(9279):404–9. http://dx.doi.org/10.1016/S0140-6736(01)05550-7

27. Tenkorang EY, Owusu GA. Correlates of HIV testing among women in Ghana: some evidence from the Demographic and Health Surveys. AIDS Care. 2010 Mar;22(3):296–307. http://dx.doi.org/10.1080/09540120903193716
28. World Health Organization (WHO). Guidance on provider-initiated HIV testing and counselling in health facilities. Geneva, Switzerland: WHO, 2007.
29. Nyuzaghl J, Ohene S, Odoi-Agyarko K. Acceptability of routine offer of HIV Testing (opt-out approach) among pregnant women in the Wa municipality. Ghana Med J. 2011 Mar;45(1):10–5. http://dx.doi.org/10.4314/gmj.v45i1.68916
30. Yoon HJ, Bonsu G, Akoto-Ampaw A, et al. Prevalence and risk factors for human immunodeficiency virus infection in pregnant women in Eastern Ghana. Braz J Infect Dis. 2012 Mar–Apr;16(2):217–8. http://dx.doi.org/10.1016/S1413-8670(12)70313-6
31. Cherutich P, Kaiser R, Galbraith J, et al. Lack of knowledge of HIV status a major barrier to HIV prevention, care and treatment efforts in Kenya: results from a nationally representative study. PLoS One. 2012;7(5):e36797. Epub 2012 May 4. http://dx.doi.org/10.1371/journal.pone.0036797
32. Yeganeh N, Varella I, Santos BR, et al. Risk-taking behavior for HIV acquisition during pregnancy in Porto Alegre, Brazil. Infect Dis Obstet Gynecol. 2012;2012:490686. Epub 2012 Dec 22.
33. Piper CN, Elder K, Olatosi B, et al. Beliefs and perception of risks of HIV among women that have never been tested for HIV in the United States. J Natl Med Assoc. 2012 Sep–Oct;104(9–10):441–8.
34. Ncube NM, Akunna J, Babatunde F, et al. Sexual risk behaviour among HIV-positive persons in Kumasi, Ghana. Ghana Med J. 2012 Mar;46(1):27–33.