

Human Papilloma Virus Distribution Across the African Diaspora

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PURPOSE Understanding the distribution of human papilloma virus (HPV) subtypes in limited-resource settings is imperative for cancer prevention strategies in these regions. The objective of our study is to compare the prevalence of cervical HPV genotypes in women across the African diaspora.

METHODS This study was approved by the African Caribbean Consortium (AC3). Six member institutions (Benin, Ethiopia, The Bahamas, Tobago, Curacao, and Jamaica) provided independently collected HPV data. Prevalence comparisons across for each nation were performed followed by an assessment of anticipated 9-valent vaccine coverage. Chi-square or Fisher's exact tests were used with significance at $P < .05$.

RESULTS One thousand three hundred fifty high-risk (HR) and 584 low-risk (LR) HPV subtypes were identified in the entire cohort. The most common HR HPV subtype was HPV 16 (17.9%) of infections. The distribution of HR and LR subtypes varied by country. The proportion of HR-HPV subtypes covered by the current 9-valent vaccine was lower in African countries compared with the Caribbean countries (47.9% v67.9%; $P < .01$). No significant difference was seen for LR subtypes (8.1% African continent v5.2% Caribbean; $P = .20$). Marked variation in the proportion of infections covered by the 9-valent vaccine persisted in individual countries.

CONCLUSION Significant variations in HPV prevalence were identified among African and Afro-Caribbean women. A large number of women in these regions are potentially uncovered by current vaccination formulation, particularly low-risk HPV infections.

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INTRODUCTION

More than 80% of new cervical cancer diagnoses and deaths occur in low- and middle-income countries.¹ The greatest burden is seen primarily in African countries^{1,2} as well as the Caribbean and Latin America.³ Persistent infection with high-risk human papilloma virus (HR-HPV) leads to cancer, whereas infection with low-risk HPV (LR-HPV) causes genital warts. Although HPV 16/18 causes 70% of cervical cancers in the United States,⁴ the role of other genotypes is warranted in more diverse populations. Baseline estimates of HPV genotypes have shown HPV 62 to be the most prevalent genotype in women age 14-59 years.⁵ Furthermore, HPV genotype prevalence may vary across regions. A nonvalent HPV vaccine has been introduced as a means to decrease the burden of HPV-related cancers, but only covers certain genotypes. The objective of this study was to identify the prevalence of HR and LR HPV genotypes in African and Caribbean countries.

METHODS

The study was approved and conducted by the African Caribbean Cancer Consortium (AC3). A collaborative

cross-sectional analysis was performed across affiliated institutions in Africa (Ethiopia and Benin) and the Caribbean (The Bahamas, Curacao, Jamaica, and Tobago). Cervical samples were collected from women undergoing screening assessments at each institution independently and analyzed. HPV DNA testing was performed on all collected samples, with identified HR-HPV and LR-HPV genotypes reported in their respective cohorts. HPV prevalence was compared across nations. Chi-square and Fisher's exact tests were used with a significance set at $P < .05$.

RESULTS

HPV genotypes were recorded in 1,350 women across all sites. HIV status was not available for all the patients in this study. Table 1 lists the most common HPV genotypes by country. Significant variation exists in the prevalence of HR-HPV and LR-HPV genotypes across the African diaspora. HR-HPV 16 was the most common HR genotype in the entire cohort, but overall comprised $< 20\%$ of infections. On an individual country level, this genotype was most prevalent in only

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CONTEXT

Key Objective

Does the current human papilloma virus (HPV) vaccine formulation provide protection against high-risk (HR) and low-risk (LR) HPV infections in African and Afro-Caribbean populations?

Knowledge Generated

HPV 16 remains the most-common HR infection in this cohort, although the prevalence of specific HR and LR HPV subtypes varies by country. Because of the differences in HR-HPV and LR-HPV infections that exist among African and Afro-Caribbean populations, a large number of women may remain uncovered by the 9-valent vaccine.

Relevance

In low-resource settings, screening for cervical cancer is limited. The HPV vaccine has been proven as method to both prevent cancer and reduce the development of high-grade dysplastic lesions from HPV infection. In regions with a high prevalence of cervical cancer, it is imperative that prevention methods are applicable and beneficial to the population.

two countries, Curacao and Ethiopia. The remaining countries showed a higher prevalence of other HR-HPV genotypes, including HPV 18, 45, 52, and 66. HPV 62 was the most common LR-HPV genotype. In only one country, Curacao, was LR-HPV 6 the most common LR-HPV genotype.

Table 2 demonstrates the proportions of HPV infections covered by nonvalent vaccine across the cohorts. The proportion of genotypes covered by nonvalent vaccine overall was lower in African countries compared with Caribbean countries (47.9% v 67.9%; $P < .01$). When evaluated on a country level, there was marked variation in the proportions of genotypes covered by the vaccine, with very low coverage of LR-HPV genotypes in the majority of locations.

DISCUSSION

In conclusion, the findings of this study demonstrate significant variations in HR-HPV and LR-HPV genotypes present in cervical samples among West and East African and Afro-Caribbean women living in their native countries. Women in The Bahamas, Jamaica, and Tobago have higher rates of non-16/18 HR-HPV infections. Furthermore, among the women with abnormal cervical pap smears, the most common HPV subtypes were non-HPV 16/18 HR

TABLE 2. Proportion of Human Papilloma Virus Infections Covered by Current 9-Valent Vaccine, by Country

Country	High-Risk (%)	Low-Risk (%)
The Bahamas	60.5	6.8
Benin	44.2	4.7
Curacao	84.2	37.5
Ethiopia	49.5	9.4
Jamaica	65.2	4.2
Tobago	53.3	0
<i>P</i> value for intercountry proportional differences	< .01	< .01

subtypes. Previous studies in Tobago demonstrated that the most common HR-HPV subtype in cervical samples was HPV 45.⁶ This suggests that HPV genotypes may vary at different periods within the same population. Current vaccine formulations do not cover the majority of LR-HPV genotypes in the countries studied, and fewer than two thirds of women would be protected against HR-HPV genotypes. These findings are important as efforts to decrease the cervical cancer incidence globally focus primarily on vaccination and screening. Although the lack of access to care plays a major role in cervical cancer incidence and mortality, other etiologies continue to warrant investigation. Understanding the nuances of unique subpopulations, especially women with the highest burden of disease, is crucial to eliminate global disparities in disease incidence and outcomes. Current screening and management recommendations risk stratify Pap results on the basis of the presence of HPV 16/18.⁷ The findings of this study suggest that further research and consideration of other HPV genotypes are necessary for the development of screening programs across the globe and may help influence strategies for HPV vaccine optimization and/or personalization in populations around the world.

TABLE 1. Most Common HPV Subtypes, by Country

Country	HR Genotype (percent of HR infections)	LR Genotype (percent of LR infections)
The Bahamas	HPV 18 (15.8)	HPV 62 (15)
Benin	HPV 66 (12.6)	HPV 43/44 (64.6)
Curacao	HPV 16 (42.1)	HPV 6 (37.5)
Ethiopia	HPV 16 (21.8)	HPV 53 (30.8)
Jamaica	HPV 45 (15.1)	HPV 62 (13.7)
Tobago (2006)	HPV 52 (15)	HPV 54 (15.8)

Abbreviations: HPV, human papilloma virus; HR, high-risk; LR, low-risk.

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