

Impact of race versus ethnicity on infertility diagnosis between Black American, Haitian, African, and White American women seeking infertility care: a retrospective review

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Objective: To determine whether infertility diagnoses differ between Black ethnic subgroups.

Design: Retrospective review.

Setting: an urban safety-net hospital.

Patient(s): Women seeking infertility care between 2005 and 2015.

Intervention(s): Charts of women with infertility and polycystic ovary syndrome (*International Classification of Diseases, Ninth Revision* diagnoses) were reviewed to confirm diagnoses. Data were stratified by race and subsequently by ethnicity to evaluate the differences in infertility diagnoses between Black American, Black Haitian, and Black African women. White American women were used as the comparison group.

Main Outcome Measure(s): Infertility diagnoses between Black ethnic subgroups and White women.

Result(s): A total of 358 women met the inclusion criteria, including 99 Black American, 110 Black Haitian, 61 Black African, and 88 White American women. Anovulation/polycystic ovary syndrome was the most common diagnosis in each ethnic group, accounting for 40% of infertility among White American, 57% among Black American, 25% among Black Haitian, and 21% among Black African women. There were no significant differences in the individual infertility diagnoses between Black and White women. Between ethnic subgroups, multivariate analysis showed significantly higher odds of infertility because of anovulation/polycystic ovary syndrome in Black American women compared with Black African women (odds ratio [OR], 4.9; 95% confidence interval [CI], 1.4–17.0). Compared with Black African women, higher odds of tubal factor infertility were observed in Black American (OR, 4.7; 95% CI, 1.16–18.7) and Black Haitian women (OR, 4.0; 95% CI, 1.1–14.0).

Conclusion(s): Infertility diagnoses were not homogeneous across Black ethnic groups. Studies examining infertility should specify the ethnic subgroups within a race because this may affect results. (Fertil Steril Rep® 2022;3:22–8. ©2021 by American Society for Reproductive Medicine.)

Key Words: Race, ethnicity, infertility, Black, Haitian, African, disparities

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Race is a determinant of infertility diagnoses, and racial disparities account for a significant proportion of poor health outcomes overall (1). Studies have demonstrated racial disparities in access to infertility care and live birth rates after assisted reproductive technologies (2, 3). Although socioeconomic status accounts for some of these findings, studies adjusting for these risk factors continue to show a significant impact of race on infertility (4–7).

Whereas prior research supports variations in the prevalence of different causes of infertility between racial groups, racial groups in the United States are heterogeneous, and differences between ethnic groups within a race may be important in predicting outcomes. In addition, some studies suggest that ethnicity may be a greater risk factor for acquiring certain medical conditions than race alone. Maalouf et al. (8) showed significant differences in the live birth rates after in vitro fertilization (IVF) treatment among women of similar races but different nationalities in the United Kingdom: they found that Black African women undergoing IVF had lower odds of live birth after IVF compared with Black Caribbean women.

Although several studies have examined the impact of race on infertility diagnosis and treatment outcomes (9, 10), few have investigated the role of ethnicity or nationality on infertility diagnoses. The Boston Medical Center (BMC), a 500-bed urban academic safety-net hospital with a large, international Black patient population, is uniquely positioned to evaluate the differences in infertility diagnoses by ethnicity. This study aims to identify the role of ethnicity in the causes of infertility among Black American, Black Haitian, and Black African women seeking infertility care at a tertiary care center.

MATERIALS AND METHODS

We conducted a 10-year retrospective chart review of all Black American, Black Haitian, Black African, and White American women seeking infertility care at the BMC between January 1, 2005, and July 15, 2015. Patients with infertility *International Classification of Diseases, Ninth Revision* (ICD-9) diagnoses seen by a reproductive endocrinologist were included in the cohort; these patients were identified by analyzing the BMC Clinical Data Warehouse database. The study was approved by the Boston University School of Medicine Institutional Review Board (no. H-34265). No funding was received for this study.

Charts were reviewed to determine infertility diagnosis with information obtained from physician notes, clinical history, and fertility testing. Data were first stratified by the place of birth, and then subdivided by self-identified race (White or Black) and among Black women ethnicity (defined as Black Haitian, Black African, or Black American) as determined by place of birth and primary language. Women were included if they had a confirmed infertility diagnosis, identified as either Black or White, and were born either in Haiti, Africa, or the United States. Women were excluded if their race and place of birth were unavailable, they identified with a race or ethnicity different from those of interest regardless of place of birth, or the infertility diagnosis could not be

corroborated from the medical record. White American women were used as a comparison group. Demographic and infertility testing results, including day 3 follicle-stimulating hormone (FSH) levels, were compared between groups. Premature ovarian failure was diagnosed in women younger than age 40 with at least two serum measurements of FSH in the menopausal range and prolonged amenorrhea. Infertility diagnoses were compared between White and Black women. Subgroup analyses were then performed comparing White women to Black Haitian, Black African, and Black American women seeking infertility treatment.

Statistical analyses using unpaired *t* test or one-way analysis of variance (ANOVA) were used to study continuous variables. Before statistical testing, continuous data were determined to be normally distributed by the Kolmogorov-Smirnov normality test. For ANOVA, a significant omnibus *F* test was followed by Fisher's protected least significant difference post hoc comparisons. Discrete data were analyzed by χ^2 tests followed by a comparison of cell χ^2 contributions. Multivariate multinomial logistic regression was then used to evaluate associations of independent variables with the dichotomous outcome variable, infertility diagnosis. Univariate and multivariate regression models were used to identify pertinent risk factors. Medical insurance type was used as a proxy for socioeconomic status, with uninsured status and Medicaid insurance as indicators of low socioeconomic status. SAS (version 9.3) and StatView (version 5.0.1) statistical software were used to perform the analyses. Statistical significance was defined as *P* value < .05.

RESULTS

A total of 1,278 women were identified by the BMC Clinical Data Warehouse database with ICD-9 codes for infertility between 2005 and 2015. Five hundred eighty-eight patients were not of racial, ethnic groups included in the study or were missing demographic data, 28 ethnically Haitian women born in the United States were excluded, and 304 patients had incomplete medical records or evaluations, were lost to follow up, or did not meet strict criteria for a diagnosis of infertility. Thus, 662 women met the inclusion criteria, and their charts were reviewed. Infertility was confirmed in 99 Black American, 110 Black Haitian, 61 Black African, and 88 White American women (Supplemental Fig. 1, available online). It should be noted that the racial and ethnic breakdown of the group of patients without a diagnosis of fertility (*n* = 304) did not differ significantly from that of the patients with a diagnosis of infertility (*n* = 358) (*P* = .28; χ^2 test; Supplemental Table 1). The demographic makeup of the patient population at the BMC from our study period was 50% Black, 25% White, 20% non-Black Hispanic, and 5% Asian. The racial/ethnic makeup of our study subjects was reflective of the patient population served by our hospital. Black women were on average of similar age to White American women at the time of their diagnosis (33 and 32 years respectively; *P* = .064) (Table 1). However, after stratification into Black ethnic subgroups, this similarity was not retained, and Black Haitians and Black Africans were on average older (35 years) at the time of diagnosis compared with Black Americans and

TABLE 1

Baseline characteristics of the groups racial/ethnic.

Demographics	Black (all ethnicities) (n = 270)	White American (n = 88)	P value	Black American (n = 99)	Black Haitian (n = 110)	Black African (n = 61)	White American (n = 88)	P value
Age	33.3 ± 6.2	32.0 ± 5.8	.064	30.6 ± 6.3	35.1 ± 5.7	34.5 ± 5.2	32.0 ± 5.8	< .001
BMI	31.4 ± 7.1	28.9 ± 8.0	.008	32.8 ± 8.9	30.6 ± 5.9	30.3 ± 5.2	28.9 ± 8.0	.004
Parity			.147					< .001
Nulliparous	191 (70.7)	71 (80.7)		73 (73.7)	82 (74.5)	36 (59.0)	71 (80.7)	
Multiparous	69 (25.6)	16 (18.2)		17 (17.2)	27 (24.5)	25 (41.0)	16 (18.2)	
Unknown	10 (3.7)	1 (1.1)		9 (9.1)	1 (0.9)	0 (0.0)	1 (1.1)	
Marital status	102 (37.8)	42 (47.7)	.358	19 (19.2)	45 (40.9)	38 (62.3)	42 (47.7)	< .001
Married	141 (52.2)	40 (45.5)		71 (71.7)	54 (49.1)	16 (26.2)	40 (45.5)	
Single Divorced/separated	6 (2.2)	2 (2.3)		1 (1.0)	3 (2.7)	2 (3.3)	2 (2.3)	
Unknown	21 (7.8)	4 (4.5)		8 (8.1)	8 (7.3)	5 (8.2)	4 (4.5)	
Employment status			< .001					< .001
Employed	115 (42.6)	56 (63.6)		48 (48.5)	45 (40.9)	22 (36.1)	56 (63.6)	
Unemployed	87 (32.2)	9 (10.2)		23 (23.2)	38 (34.5)	26 (42.6)	9 (10.2)	
Other	23 (8.5)	8 (9.1)		11 (11.1)	10 (9.1)	2 (3.3)	8 (9.1)	
Unknown	45 (16.7)	15 (17.0)		17 (17.2)	17 (15.5)	11 (18.0)	15 (17.0)	
Insurance type			< .001					< .001
Medicaid/uninsured	149 (55.2)	12 (13.6)		45 (45.5)	67 (60.9)	37 (60.7)	12 (13.6)	
Commercial/military	118 (43.7)	74 (84.1)		53 (53.5)	42 (38.2)	23 (37.7)	74 (84.1)	
Unknown	3 (1.1)	2 (2.3)		1 (1.0)	1 (0.9)	1 (1.6)	2 (2.3)	
Day 3 FSH			.085					< .001
< 10 mIU/ml	207 (76.7)	77 (87.5)		88 (88.9)	77 (70.0)	42 (68.9)	77 (87.5)	
≥ 10 mIU/ml	28 (10.4)	4 (4.5)		1 (1.0)	17 (15.5)	10 (16.4)	4 (4.5)	
Unknown	35 (13.0)	7 (8.0)		10 (10.1)	16 (14.5)	9 (14.8)	7 (8.0)	

Note: Data presented as mean ± SD or n (%) unless specified otherwise. Black women (all ethnicities) were compared with White American women with *t* test or χ^2 test. For all racial/ethnic group comparisons, analyses were performed with ANOVA or χ^2 test. ANOVA = analysis of variance; BMI = body mass index; FSH = follicle-stimulating hormone.

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TABLE 2

Infertility diagnoses by race and ethnic group.^a

Infertility diagnosis	Black (all ethnicities) (n = 270)	White American (n = 88)	Black American (n = 99)	Black Haitian (n = 110)	Black African (n = 61)	White American (n = 88)
Anovulation/PCOS	97 (35.9)	35 (39.8)	56 (56.5)	28 (25.5)	13 (21.3)	35 (39.8)
Premature ovarian failure	17 (6.3)	3 (3.4)	3 (3.0)	3 (2.7)	11 (18.0)	3 (3.4)
Tubal factor	53 (19.6)	6 (6.8)	18 (18.2)	28 (25.5)	7 (11.5)	6 (6.8)
Uterine factor	40 (14.8)	8 (9.1)	7 (7.1)	23 (20.9)	10 (16.4)	8 (9.1)
Unexplained ^b	36 (13.3)	26 (29.5)	8 (8.1)	17 (15.5)	11 (18.0)	26 (29.5)

Note: Data presented as n (%) unless specified otherwise. FSH = follicle-stimulating hormone.

^a Overall $P < .001$ for Black (All Ethnicities) vs. White American women (χ^2 test), and overall $P < .0001$ for all racial/ethnic group comparisons (χ^2 test).

^b All patients with unexplained infertility had day 3 FSH < 10 .

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White Americans (31 and 32 years respectively; $P < .001$). Body mass index (BMI) was higher among Black compared with White American women ($P = .008$), and this difference was maintained after a subgroup analysis of Black ethnic groups, with the highest BMI seen among Black American women ($P = .004$).

There was no significant difference in parity or marital status between all Black women combined compared with White American women. However, subgroup analysis of Black ethnic subgroups showed differences in both parity and marital status between groups. In terms of parity, 41% of Black African women were multiparous compared to 25% of Black Haitian, 17% of Black American, and 18% of White American women ($P < .001$). Black African women (62%) were more likely to be married than Black American (19%), Black Haitian (41%), and White American (48%) women ($P = .007$). A greater proportion of Black women (32%) were unemployed compared with White American women (10%; $P = .003$). Subgroup analysis comparing White women and Black ethnic subgroups continued to show this difference, with Black Africans having the highest rate of unemployment (43%), followed by Black Haitians (35%; $P < .001$). In addition, Black women were more likely to be uninsured or on Medicaid compared with White American women (55% and 14% respectively; $P < .001$). This difference was maintained when Black ethnic groups were stratified, with the highest uninsured rate seen among Black Haitians (61%) and Black Africans (61%; $P < .001$).

Infertility diagnoses fell into six categories: anovulation/polycystic ovary syndrome (PCOS), tubal factor, uterine factor, male factor, premature ovarian failure (POF), and unexplained. Table 2 and Supplemental Figure 1 summarize the prevalence of the various infertility diagnoses in the racial/ethnic groups. Initial analysis was performed comparing all Black women (i.e., by combining ethnicities) with White American women. A significantly higher proportion of Black women (19.6%) had infertility secondary to tubal factors compared with White American women (6.8%; $P = .03$). In addition, White American women (29.5%) had a significantly higher frequency of unexplained infertility compared with Black women (13.3%; $P = .006$).

With regard to comparisons with racial/ethnic subgroups, Black American women had a higher frequency of infertility secondary to anovulation/PCOS (56.5%; $P = .001$) compared with White American (39.8%), Black Haitian (25.5%), and Black African women (21.3%). Black African women had a higher percentage of infertility secondary to POF (18.0%) compared with the other groups that ranged between 2.7% and 3.4% ($P = .0004$). A comparison of day 3 FSH levels showed no difference in rates of elevated day 3 FSH level (≥ 10 mIU/ml) among all Black women (10%) compared with White women (4.5%; $P = .09$). However, the stratified analysis of Black ethnic subgroups showed a greater percentage of Black African (16%) and Black Haitian (16%) women with elevated day 3 FSH compared with Black (1.0%) and White (4.5%) American women ($P = .001$; Table 1). White American women had a lower frequency of infertility secondary to tubal factor (6.8%) than the other groups of women, especially in comparison to Black Americans (18.2%) and

TABLE 3

Multivariate multinomial logistic regression model of racial/ethnic groups as risk factors for various infertility diagnoses.

Infertility diagnosis	Race and ethnicity (%)		Unadjusted odds ratio (95% CI)	Adjusted odds ratio (95% CI) ^a
Anovulatory/PCOS	White Americans (39.8)	Black Americans (56.5)	2.29 (0.80, 6.56)	1.52 (0.48, 4.78)
	White Americans (39.8)	Black Haitians (25.5)	0.73 (0.27, 1.96)	0.75 (0.24, 2.33)
	White Americans (39.8)	Black Africans (21.3)	0.41 (0.14, 1.24)	0.31 (0.09, 1.10)
	Black Americans (56.5)	Black Haitians (25.5)	0.32 (0.11, 0.91)	0.49 (0.16, 1.53)
	Black Africans (21.3)	Black Americans (56.5)	5.54 (1.74, 17.62)	4.87 (1.40, 16.97)
	Black Africans (21.3)	Black Haitians (25.5)	1.76 (0.59, 5.29)	2.40 (0.74, 7.73)
Premature ovarian Failure (POF)	White Americans (3.4)	Black Americans (3.0)	1.43 (0.22, 9.26)	1.72 (0.24, 12.14)
	White Americans (3.4)	Black Haitians (2.7)	0.91 (0.15, 5.58)	1.01 (0.14, 7.10)
	White Americans (3.4)	Black Africans (18.3)	4.07 (0.85, 19.44)	3.75 (0.65, 21.45)
Tubal factor	Black Americans (3.0)	Black Haitians (2.7)	0.64 (0.10, 4.09)	0.59 (0.08, 4.10)
	Black Africans (18.3)	Black Americans (3.0)	0.35 (0.07, 1.76)	0.46 (0.08, 2.54)
	Black Africans (18.3)	Black Haitians (2.7)	0.22 (0.05, 1.05)	0.27 (0.05, 1.36)
	White Americans (6.8)	Black Americans (18.2)	4.29 (1.13, 16.31)	3.52 (0.86, 14.44)
	White Americans (6.8)	Black Haitians (25.5)	4.24 (1.24, 14.50)	3.02 (0.78, 11.72)
	White Americans (6.8)	Black Africans (11.5)	1.30 (0.32, 5.33)	0.76 (0.16, 3.56)
	Black Americans (18.2)	Black Haitians (25.5)	0.99 (0.32, 3.03)	0.86 (0.26, 2.83)
	Black Africans (11.5)	Black Americans (18.2)	3.31 (0.89, 12.36)	4.65 (1.16, 18.74)
	Black Africans (11.5)	Black Haitians (25.5)	3.27 (0.98, 10.97)	4.00 (1.14, 14.04)
Uterine factor	White Americans (9.1)	Black Americans (7.1)	1.25 (0.31, 5.07)	1.53 (0.34, 6.84)
	White Americans (9.1)	Black Haitians (20.9)	2.61 (0.81, 8.46)	2.63 (0.69, 9.98)
	White Americans (9.1)	Black Africans (16.4)	1.39 (0.38, 5.07)	1.18 (0.27, 5.14)
	Black Americans (7.1)	Black Haitians (20.9)	2.09 (0.59, 7.45)	1.72 (0.45, 6.62)
	Black Africans (16.4)	Black Americans (7.1)	0.90 (0.23, 3.58)	1.30 (0.30, 5.65)
	Black Africans (16.4)	Black Haitians (20.9)	1.88 (0.60, 5.96)	2.23 (0.66, 7.54)
Unexplained	White Americans (29.5)	Black Americans (8.1)	0.44 (0.13, 1.53)	0.46 (0.12, 1.71)
	White Americans (29.5)	Black Haitians (15.5)	0.59 (0.21, 1.70)	0.75 (0.23, 2.43)
	White Americans (29.5)	Black Africans (18.0)	0.47 (0.15, 1.48)	0.46 (0.13, 1.66)
	Black Americans (8.1)	Black Haitians (15.5)	1.35 (0.38, 4.80)	1.62 (0.43, 6.10)
	Black Africans (18.0)	Black Americans (8.1)	0.94 (0.24, 3.58)	1.01 (0.25, 4.13)
	Black Africans (18.0)	Black Haitians (15.5)	1.26 (0.40, 4.04)	1.64 (0.49, 5.51)

Note: Data presented as n (%) unless specified otherwise. CI = confidence interval.

^a Analysis adjusted for age, body mass index, parity, and socioeconomic status.

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Black Haitians (25.5%; $P=.03$). Black Haitians (20.9%) and Black Africans (16.4%) had a higher frequency of infertility secondary to uterine factor than either Black (7.1%) or White Americans (9.1%; $P=.03$). There were no differences in the frequency of male factor infertility among the groups. In Black Haitian and Black African women, infertility diagnoses were more evenly distributed compared with the other two groups, with anovulation/PCOS (25.5% and 21.3%), tubal factor (25.5% and 11.5%), and uterine factor (20.9% and 16.4%), respectively, comprising most infertility diagnoses (Table 2).

Table 3 and Supplemental Table 2 present the final unadjusted and adjusted multivariate logistic regression analyses. The regression analyses were adjusted for factors known to influence fertility, including age, BMI, parity, and socioeconomic status. There were no differences in the prevalence of male factor infertility among the groups, so only infertility factors affecting women were included in the analysis. Supplemental Table 2 summarizes the prevalence of the various infertility diagnoses in the White and combined Black groups and shows the adjusted and unadjusted analyses between racial groups. Tubal factor infertility was more common in Black compared with White women (19.6% and

6.8% respectively; $P=.04$), but this difference was not retained in the adjusted analysis ($P=.15$). There were no other significant differences in infertility diagnoses between Black and White races after adjusting for potential confounders. In the multivariate model comparing infertility diagnoses between the White and Black ethnic groups (Table 3), Black American women had a five-fold higher odds of having PCOS/anovulation compared with Black African women (95% CI, 1.4–17.0). In addition, compared with Black African women, higher odds of tubal factor infertility were observed in Black American (adjusted OR [aOR], 4.7; 95% CI, 1.2–18.7) and Black Haitian women (aOR, 4.0; 95% CI, 1.4–14.0). No other significant differences were seen among specific ethnic groups for POF, uterine factor, and unexplained infertility diagnoses.

DISCUSSION

Main Findings

Studies investigating the association between ethnicity and infertility are limited. In this study, we found differences in the prevalence of infertility diagnoses between certain Black ethnic groups. The infertility diagnoses among Black Haitian

and Black African women were more evenly distributed than among White and Black American women. Black Haitian and Black African women had a similar distribution of infertility diagnoses, whereas the distribution of infertility diagnoses among Black and White American women more closely mirrored each other. Furthermore, we observed differences between White women and different Black ethnic groups that were not apparent when all Black women were grouped together. Generally, Black American women had baseline characteristics more similar to White American women than Black African and Black Haitian women. Black American women also had a prevalence of infertility diagnoses more similar to White American women than their Black ethnic counterparts. Regarding specific infertility diagnoses, Black African women were less likely to have PCOS/anovulation compared with Black American women after adjusting for BMI and age. Furthermore, ethnic group differences were also seen in the prevalence of tubal factor infertility. Black American and Black Haitian women had higher rates of tubal factor infertility compared with Black African women. The rates of tubal factor infertility were not significantly different between White American women and Black African women. Black African women were observed to have a high rate of POF. This may be because of the sample size, and there is no clear explanation for this observation. Thus, it merits further study.

Other studies have attempted to assess the relationship between race and reproductive outcomes. Bougie et al. (10) found that Black women were less likely to be diagnosed with endometriosis compared with White women, obscuring the prevalence of endometriosis seen in their population. Seifer et al. (9) found that Black race was an independent risk factor for lower live birth rates from assisted reproductive technology in the United States and that Black women undergoing fertility treatment were more likely to have tubal and/or tubal factor infertility as well as higher BMI (≥ 30 kg/m²). However, neither of these studies assessed how Black ethnic subgroups impacted infertility diagnoses and outcomes.

Strengths and Limitations

The strength of our study is the unique and large international Black patient population at BMC that created the potential to study the ethnic differences within a racial group. We are the first to describe differences in infertility diagnoses within a race. Furthermore, the robust chart analysis used in this study allowed for more accurate stratification of race and ethnicity as well as confirmation of infertility diagnoses without sole dependence on ICD-9 coding. The potential for misclassification bias was limited by using a combination of race, place of birth, and language to help confirm each woman's racial and ethnic identity. By identifying differences in infertility diagnoses within the Black race, our study indicates that other factors beyond race may influence infertility.

Limitations of our study include its retrospective nature and the small sample size for each ethnic subgroup. We may have been underpowered to see small differences between groups. We attempted to limit the selection bias inherent in retrospective studies by having two independent

investigators conduct chart reviews. In addition, because ICD-9 codes were used to identify the potential cohort, it is possible that women with improper ICD-9 infertility coding were missed. Lastly, the duration of residency in the United States for Black Haitian or Black African women could not be ascertained and controlled to quantify the impact of the United States' cultural and environmental influences on their infertility diagnoses. The lack of difference in the prevalence of male factor infertility between groups was limited by our inability to confirm the semen analysis results of male partners of all subjects. Furthermore, the race and ethnicity of the male partners were not obtained, and we could not assess whether male partner racial and ethnic differences impacted rates of male factor infertility.

Interpretation

The more similar distribution of infertility diagnoses seen among White and Black American women compared with Black Haitian and Black African women point to the potential stronger influence of environmental factors on infertility than race alone. Some of the differences may also be attributable to more limited access to infertility care seen among women not born in the United States, as suggested by the higher age at presentation, lower rates of commercial insurance, and higher unemployment rates seen among Black African and Black Haitian women. Black African and Black Haitian women also had higher day 3 FSH levels at baseline compared with Black American and White American women, further suggesting that immigrant women present for care at a later age than their American counterparts.

The differences in infertility diagnosis prevalence seen between Black ethnic groups may be secondary to environmental rather than genetic influences. Differences in the rate of PCOS/anovulation between Black American women and Black African women suggest that genetics may not be the most important factor impacting their diagnosis. Other ethnic group differences, such as those seen for tubal factor infertility between Black African women compared with Black American and Black Haitian women, may be attributable to lifestyle differences.

CONCLUSION

Our study shows that race and ethnicity are two separate patient characteristics affecting infertility and likely other disease processes. There may be inherent and environmental factors within one race that increase the risk of different infertility diagnoses. We found that ethnicity appears to play a more significant role in the cause of infertility than previously suspected. Although our study suggests that the presumed etiology of infertility differs between ethnic groups belonging to the same race, larger prospective studies are needed to elucidate the impact of race, ethnicity, and environment on infertility diagnoses.

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