

## Systematic Review

# Cardiovascular Health and Healthcare Use of United States-Born and African-Born Blacks: A Review

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### ABSTRACT

Cardiovascular disease (CVD) is the leading cause of death globally, with Blacks in the United States (U.S.) disproportionately affected. Healthcare access and utilization have been reported as risk factors for poorer cardiovascular health among several U.S. populations.

#### Aims and Objectives

The purpose of this systematic literature review was to examine the results of existing studies reporting on cardiovascular health and healthcare utilization by African-born compared to U. S. -born Blacks.

#### Methods

A systematic literature review was conducted using keywords and medical subject headings (MESHs) in the PUBMED, Web of Science and CINAHL electronic databases. Exclusion and inclusion criteria determined articles to be reviewed for eligibility and methodological soundness. A pooled analysis was performed on all studies.

#### Results

Only seven studies met inclusion criteria. Four compared U. S. -born with African-born Blacks residing in the United States, while three compared U. S. -born Blacks with Blacks residing elsewhere. None of the studies examined the associations between healthcare utilization and cardiovascular health for these populations.

#### Conclusion

The results of this review indicate a need to examine the impact of healthcare utilization for increasing awareness, prevention and treatment of CVD in Blacks who reside in the United States regardless of their nativity.

#### Keywords

Cardiovascular health; African-born Blacks; U.S-born blacks; Healthcare utilization.

#### Abbreviations

CVD: Cardiovascular disease; US: United States; MESHs: Medical subject headings; sBP: Systolic blood pressure; dBP: Diastolic blood pressure; BMI: Body mass index; BP: Blood pressure.

### INTRODUCTION

Cardiovascular disease (CVD) is the leading cause of death globally.<sup>1</sup> The prevalence of hypertension, a known risk factor for developing CVD, is the highest in the world for U. S. -born Blacks.<sup>2</sup> The American Heart Association reports that “*little has changed since 2005 when notable disparities were observed in prevalence, disease management and outcomes*” in CVD rates for Black populations in the United States.<sup>2</sup>

To date, researchers do not have a definitive explanation for why Blacks in the United States are more predisposed to worse cardiovascular outcomes than their White counterparts.<sup>3</sup> Major differences in cardiovascular outcomes have also been observed among people of African-born origin when compared to U. S. -born Blacks. Specifically, traditional African populations show a low prevalence of cardiovascular risk factors such as hypertension, high cholesterol, diabetes mellitus, obesity, physical activity, smok-

ing status, and diet.<sup>4,5</sup> Forrester<sup>6</sup> states that genetics seem to be a likely factor to explain this scenario; however, no causative gene has been identified and researchers have been unable to support the proposal that populations of African origin are genetically predisposed to developing CVD. Hence, it remains instructive to look at non-genetic factors that might account for the CVD disparities experienced by African-origin Blacks residing in the United States. This critical literature review appraised existing studies that examined cardiovascular health in African-born Blacks compared to U. S. -born Blacks, as well as associations between healthcare utilization and cardiovascular health for these populations.

## BACKGROUND

Africans now make up 39% of the overall foreign-born Black population in the United States (up from 24% in 2000), and their population more than doubled between 2000 and 2016<sup>7</sup> making them the fastest growing group of foreign-born Blacks in the United States.<sup>8</sup> It is challenging to determine the contribution of cultural, social, behavioral and lifestyle contributions to the cardiovascular health and other health outcomes of U. S. -born *versus* African-born Blacks because most studies treat Blacks in the United States as a monolithic group.<sup>9-11</sup>

Results of research by Venters et al<sup>12</sup> suggest that African-born Blacks experience better health outcomes, including a lower prevalence of chronic diseases such as hypertension because of the “*healthy immigrant effect*.” Their research suggests that immigrants are likely healthier than their host counterparts due to migrant selectivity during the immigration process. Despite this claim, studies in other immigrant groups show that through acculturation, the health of immigrants declines as they adopt the lifestyle practices and health behaviors of their host society.<sup>13,14</sup>

It is unclear whether the acculturation effect is impacted by region of birth or if it is the result of other factors. For example, Golub et al<sup>15</sup> showed that African refugees from Liberia had the highest-levels of hypertension after resettlement compared to all other refugee immigrants. In comparison, those from other African countries (Burkina Faso, Burundi, Chad, Congo, Eritrea, Ethiopia, Nigeria, Sierra Leone, Togo) had the lowest-levels of hypertension. Within a year of resettlement in the United States, immigrants from other African countries had the lowest levels of diabetes while those from Somalia had the highest-levels of diabetes. There were several confounding factors observed among resettled refugee adults with longer length of stay in the United States, including increased odds of Type 2 diabetes and hypertension, irrespective of country of origin.

Recent studies of Africans residing in the United States show similar or higher rates of CVD risk factors. Njeru and colleagues<sup>16</sup> found that Somali immigrant patients had a significantly higher prevalence of diabetes, pre-diabetes and obesity than did non-Somali patients. Measuring CVD risk factors in a population of Nigerians and Ghanaians in the United States, Commodore-Mensah et al<sup>17</sup> found a prevalence of hypertension at 40%, diabetes at 16%, and of being overweight or obesity at 88%. Overall, 80% of those sampled were reported to have at least two CVD

risk factors. These statistics are alarming given the fact that 79% of those in the study were employed, 60% had a college degree or higher, and 48% were uninsured. However, due to a lack of population frame of West African immigrants in the United States, we are unable to compare these results to the general population.

Derosé et al<sup>18</sup> report that educational attainment, type of occupation, and earnings directly and indirectly influence immigrants’ access to health care resources. This could explain why there was such a high prevalence of CVD risk among the immigrant population in the Commodore-Mensah et al<sup>17</sup> study described above. Legal status is another vulnerability risk factor to accessing healthcare even though 77% of immigrants reported that they were permanent residents of the United States. It is likely that these high-risk rates are because of acculturation since 67% of those sampled lived in the United States for 10-years or more. Such findings challenge the argument for the healthy immigrant effect among African-born Blacks.<sup>19</sup>

There is a need for researchers to delineate health risk and outcomes data on African-born Blacks from those for U.S.-born Blacks. With such knowledge, more effective programs might be developed that could reduce the disparities between Blacks and Whites residing in the United States. Concerted prevention and treatment efforts addressing the cultural differences among Black subgroups could be more effective than those addressing the group as a monolith.

Having health insurance has also been shown to reduce the risk of CVD. For example, a study of West African immigrants in the United States found an association between women having health insurance and a reduced risk of CVD.<sup>20</sup> African immigrants as a whole were the least likely to be insured and were also less likely to report having seen a doctor in the past year. The authors also reported African immigrants had the highest prevalence of hypertension and diabetes.

Despite the findings listed above, no study to date has comparatively analyzed the association between healthcare utilization and cardiovascular health among African-born and U.S.-born Blacks. Therefore, this critical literature review sought out existing studies that examined cardiovascular health in African-born Blacks compared to U.S.-born Blacks and any reports on the associations between healthcare utilization for those groups and cardiovascular health outcomes.

## METHODS

This study protocol was reviewed and granted exempt status by the Rutgers University IRB on May 19, 2020 (#Pro2020000823). The strategy for this systematic literature review followed PRISMA guidelines.<sup>21</sup> One hundred two (102) studies were systematically examined related to the cardiovascular health of African-born and U. S. -born Blacks to assess whether healthcare utilization was examined as a predictor for cardiovascular health. Searches were undertaken using keywords and medical subject headings (MESHs) in the PUBMED, Web of Science and CINAHL electronic databases. Subsequently, the reference list of relevant identified articles was

examined to retrieve other studies that were not included in either of the three databases. Keywords and MESHs, truncated and exploded to capture as many articles as possible, were used in the development of search strategies, including: African immigrants, Sub-Saharan African born, Africa born Blacks, African American, U.S. born Black, Black Americans, Blacks, healthcare utilization, healthcare use, healthcare accessibility, health access, access to health care, realized access, cardiovascular disease, cardiovascular health. The exact syntax of the search terms is available from the first author upon request. In order to not limit the search, articles were selected from 1900 through 2019, however, they were limited to English language journals and adult-only populations.

### Study Selection and Data Extraction

A 3-stage screening process was conducted, starting with a title review, followed by an abstract review, and ending with a full-text article review (Figure 1). Inclusion criteria were: studies comparing U. S. -born with African-born Blacks; studies of cardiovascular health factors (i.e., hypertension, obesity, physical activity, smoking, diabetes mellitus, high cholesterol, nutrition); studies of access to healthcare or healthcare utilization (i.e., insurance status, usual

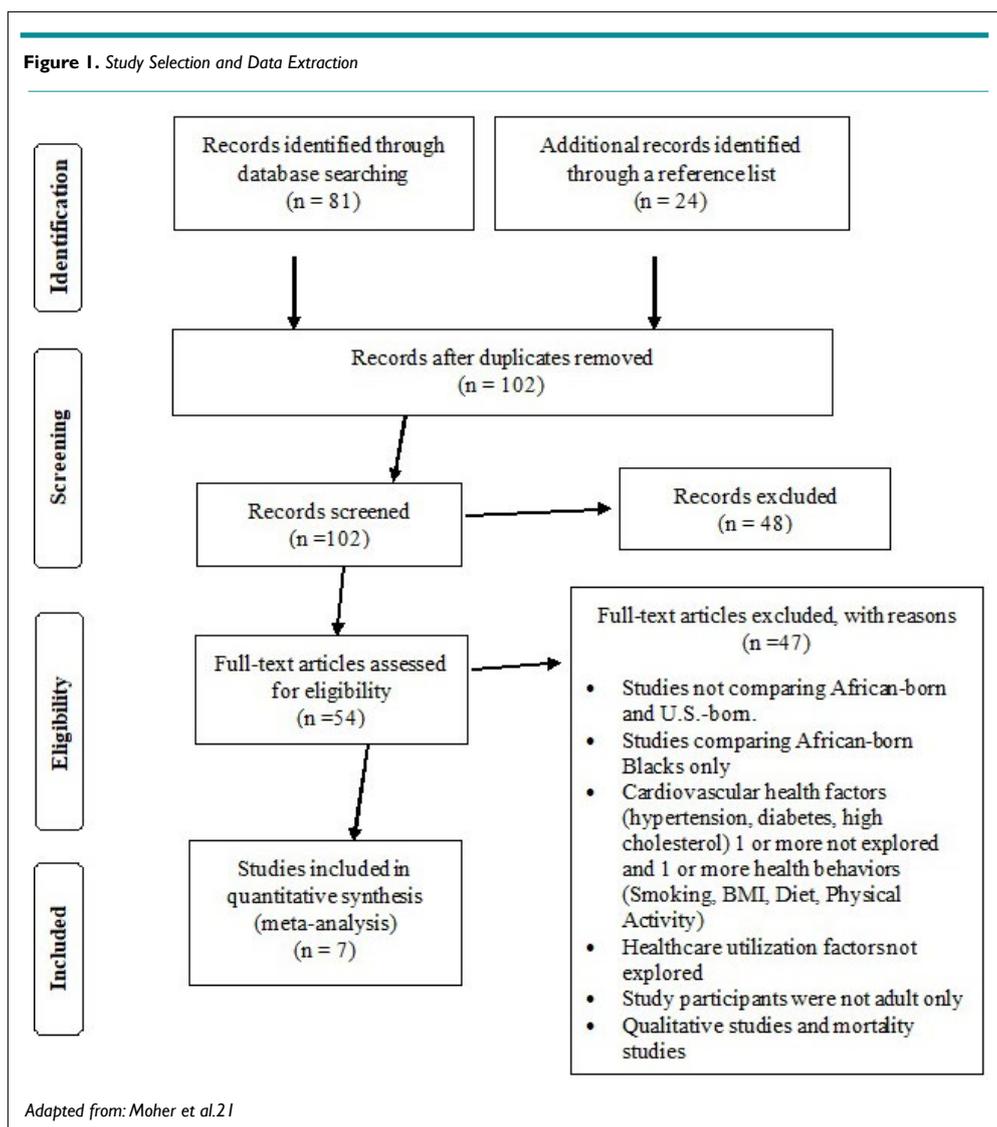
source of care, having a regular provider). Exclusion criteria were studies of mortality or using qualitative data only.

In the title review phase, 102 articles were screened and 48 articles were excluded, yielding 54 relevant articles. Articles were excluded that did not indicate if foreign-born Blacks in the study originated from Africa. Abstracts of the articles were examined for keywords; however, to avoid losing any relevant articles all 54 articles were reviewed fully. The full texts of the articles were then thoroughly examined for eligibility based on the inclusion criteria and methodological soundness. A pooled analysis was performed on all studies.

### RESULTS

Figure 1 shows the systematic literature review process with the resulting number of articles remaining at each step. Seven (7) studies were eventually included in this review, as one eligible study was dropped as the participants were identical to those in one of the other studies selected.<sup>22</sup>

Four (4) of the studies compared African-born Blacks



residing in the United States with U. S. -born Blacks only. Three (3) of the studies compared Africans living in Africa to U. S. -born Blacks residing in the United States. All of the studies examined systolic blood pressure (sBP), diastolic blood pressure (dBp), and body mass index (BMI); five (5) studied diabetes (fasting glucose); three (3) studied total cholesterol; three (3) studied physical activity and smoking, and one (1) examined subjects' fruit and fiber intake. Only one of the seven studies looked at access to healthcare (insurance), and none measured healthcare utilization (Table 1).

### Black Africans Living in the United States vs. U.S.-Born Blacks

In the four studies examining Africans residing in the United States, the majority had lived in the country for 10-years or more (over 80% in one study). Sample sizes in the studies ranged from 95 to 214 individuals. Three of the studies examined men only<sup>23,25</sup> while the study by Hyman et al<sup>26</sup> examined men and women. Two of the studies used physical measurements that were taken after a 12-hour fast using a standard epidemiological protocol of rest in a seated position for a period, then taking three separate blood pres-

sure measurements with two-minutes separating each reading. The first reading was omitted and the last two were averaged to obtain the sBP and dBp.<sup>25,26</sup>

Table 2 shows a detailed analysis of the measurements which were available for all four studies by sex. Africans were not delineated into regions of origin except in the O'Connor et al<sup>23</sup> study. The mean age of participants ranged from 34-years to 45-years. The mean sBP ranged from 121.8 to 130 mmHg; the mean dBp ranged from 71 to 82.7 mmHg; and the mean fasting glucose ranged from 86 to 103.2 mg/dL. The mean total cholesterol levels ranged from 153 to 200.9 mg/dL. Lastly, the mean BMI levels ranged from 26.3 to 31.3. Ukegbu et al<sup>27</sup> did not report total cholesterol levels.

Physical activity was reported for those who indicated exercising moderately or more (i.e. 30-minutes or more), for at least three times a week.<sup>23,24,26</sup> The range of participants who exercised moderately was from 17% to 72%; Ukegbu and et al<sup>25</sup> did not report physical activity levels. Lastly, two studies reported smoking

**Table 1.** Description of Selected Studies, by Year of Publication

Author	Title	Journal	Populations	N	Years in U.S.	Gender	Risk Factors
O'Connor et al <sup>23</sup>	Worse cardiometabolic health in African immigrant men than African American men: reconsideration of the healthy immigrant effect	Circulation	African-born, African American	214	11±9 (0.1-42)	Males	BMI, hypertension, cholesterol, diabetes, physical activity, smoking, insurance
Cooper et al <sup>31</sup>	The prevalence of hypertension in seven populations of West African origin	American Journal of Public Health	West African (Nigeria and Cameroon); Caribbean (Jamaica, St. Lucia, Barbados); U.S.-born Black (metropolitan Chicago)	10,014	-	Both	BMI, hypertension
Hyman et al <sup>26</sup>	Lower hypertension prevalence in first-generation African immigrants compared to US-born African Americans	Ethnicity and Disease	African-born, African American	182	< 5=7% 5-10=3% >10=80%	Both, not delineated	BMI, hypertension, cholesterol, diabetes, diet, physical activity
Poston et al <sup>22</sup>	Genetic bottlenecks, perceived racism, and hypertension risk among African Americans and first-generation African immigrants	Journal of Human Hypertension	African-born, African American	185	< 5=7% 5-10=3% >10=80%	Both	BMI, hypertension, cholesterol, diabetes, smoking
Ukegbu et al <sup>25</sup>	Metabolic syndrome does not detect metabolic risk in African men living in the U.S.	Diabetes Care	African-born, African American	95	10±7 (0.2-27)	Males	BMI, hypertension, diabetes, cholesterol
Yu et al <sup>24</sup>	Triglyceride-Based Screening Tests Fail to Recognize Cardiometabolic Disease in African Immigrant and African-American Men	Metabolic Syndrome Related Disorders	African-born, African American	155	10±10	Males	BMI, hypertension, diabetes, smoking, physical activity, cholesterol
Okosun et al <sup>32</sup>	Association of waist circumference with risk of hypertension and type 2 diabetes in Nigerians, Jamaicans, and African-Americans	Diabetes Care	Nigerian, Jamaican, African-American	5,042	-	Both	BMI, hypertension, diabetes
Cooper et al <sup>33</sup>	Elevated hypertension risk for African-origin populations in biracial societies: Modeling the Epidemiologic Transition Study	Journal of Hypertension	African American (Chicago), Jamaican (Kingston), Rural Ghanaian, South African (Cape Town), Seychelles	2500	-	Both	BMI, hypertension

Note: \* All studies were cross-sectional in design

**Table 2.** Subjects and cardiovascular risk factors among African and U.S-born Blacks residing in the United States, by sex and year of publication

Author	Origin of Population	N (%)	Mean Age $\pm$ SD	sBP $\pm$ SD	dBp $\pm$ SD	Fasting glucose $\pm$ SD	Total	BMI $\pm$ SD	Physical Activity %	Smoker %
<b>Male Subjects</b>										
Hyman et al <sup>26</sup>	Africa	19 (59.3)	43 $\pm$ 7.2	126.6 $\pm$ 20.1	82.0 $\pm$ 12.7	99.8 $\pm$ 41.3	197.3 $\pm$ 46.9	26.3 $\pm$ 3.2	72	-
	U.S.	13 (40.6)	43 $\pm$ 7.1	129.5 $\pm$ 15.5	82.7 $\pm$ 9.9	95.3 $\pm$ 11.3	191.0 $\pm$ 55.5	31.1 $\pm$ 5.7	50	-
Ukegbu et al <sup>25</sup>	Africa	39 (41)	38 $\pm$ 5	130 $\pm$ 14	79 $\pm$ 10	94 $\pm$ 9	-	28 $\pm$ 4.3	-	-
	U.S.	56 (59)	38 $\pm$ 6	121 $\pm$ 13	71 $\pm$ 9	89 $\pm$ 8	-	30.5 $\pm$ 6.4	-	-
Yu et al <sup>24</sup>	Africa	80 (52)	36 $\pm$ 9	126 $\pm$ 13	76 $\pm$ 9	92 $\pm$ 8	158 $\pm$ 31	27.3 $\pm$ 3.8	27	6
	U.S.	75 (48)	35 $\pm$ 8	121 $\pm$ 12	71 $\pm$ 10	88 $\pm$ 8	174 $\pm$ 41	29.8 $\pm$ 6.2	35	21
	West Africa	68 (32)	40 $\pm$ 10	126 $\pm$ 14	76 $\pm$ 10	92 $\pm$ 14	166 $\pm$ 33	27.2 $\pm$ 3.8	32	8
	Central Africa	41 (19)	35 $\pm$ 8	125 $\pm$ 13	74 $\pm$ 10	92 $\pm$ 9	153 $\pm$ 30	28.0 $\pm$ 4.3	17	0
	East Africa	29 (13.5)	35 $\pm$ 7	122 $\pm$ 11	74 $\pm$ 9	92 $\pm$ 7	161 $\pm$ 31	26.9 $\pm$ 3.4	31	12
	U.S.	76 (35.5)	34 $\pm$ 8	121 $\pm$ 12	71 $\pm$ 9	86 $\pm$ 7	175 $\pm$ 41	29.3 $\pm$ 5.5	49	16
<b>Female Subjects</b>										
Hyman et al <sup>26</sup>	Africa	66 (44)	40 $\pm$ 5.8	121.8 $\pm$ 15.4	77.6 $\pm$ 11.0	91.7 $\pm$ 16.9	199.4 $\pm$ 59.2	28.9 $\pm$ 3.9	30	-
	U.S.	84 (56)	44.9 $\pm$ 9.0	124.8 $\pm$ 17.0	82.7 $\pm$ 9.9	103.2 $\pm$ 42.7	200.9 $\pm$ 45.9	31.3 $\pm$ 5.7	50	-

Notes: \*Systolic blood pressure; \*\*Diastolic blood pressure; \*\*\*Body mass index

**Table 3.** Results of Pooled Analysis for Cardiovascular Risk Factors among African Born and U.S.-born Black Males Residing in the United States

Region	N (%)	Mean Age $\pm$ SD	sBP $\pm$ SD	dBp $\pm$ SD	Fasting glucose $\pm$ SD	Total cholesterol $\pm$ SD	BMI $\pm$ SD	Physical Activity %	Smoker %
African	276 (56)	37.8 $\pm$ 7.7	126 $\pm$ 14.2	77 $\pm$ 10.1	93.6 $\pm$ 14.7	167.1 $\pm$ 29 <sup>†</sup>	27.3 $\pm$ 3.8	35.8 <sup>††</sup>	6.5 <sup>††</sup>
United States	220 (44)	37.5 $\pm$ 7.2	123 $\pm$ 13	74 $\pm$ 9.5	89.6 $\pm$ 8.6	180 $\pm$ 46 <sup>†</sup>	30.2 $\pm$ 6	45 <sup>††</sup>	18.5 <sup>††</sup>

Notes: \*Systolic blood pressure; \*\*Diastolic blood pressure; \*\*\*Body mass index; <sup>†</sup>Ukegbu et al<sup>25</sup> missing; <sup>††</sup>Hyman et al<sup>26</sup> missing

rates from 0% to 21%.<sup>23,24</sup> African women reported lower-levels on all measurements compared to U.S.-born Black women, indicating a lesser risk of CVD for African born women living in the United States.

Table 3 presents the results of the pooled analysis for males residing in the United States. There were no significant differences in the ages of African men and U. S. -born Blacks who were sampled. African men reported higher sBP and dBp, indicating a higher-risk of hypertension compared to U. S. -born Black men.

African men also reported significantly higher-levels of glucose than did U.S.-born Black men (93.6 $\pm$ 14.7 mg/dL compared to 89.6 $\pm$ 8.6 mg/dL). U. S. -born Black men however, reported higher cholesterol levels and BMIs, physical activity, and smoking levels. Comparing this pooled analysis of the men with the women studied in Hyman et al's<sup>26</sup> study, the women studied were older, had a higher BMI, were less likely to smoke, and were just as likely to be physically active across both African-born and U.S.-born Blacks.

African-born men were more likely to have elevated risk of hypertension and higher glucose levels than African-born women, while African-born women were significantly more likely to have high cholesterol. U.S.-born Black men were significantly

less likely to have higher glucose levels and higher cholesterol than U.S.-born Black women and they had similar elevated risks of hypertension.

Each study reported mean BMI levels of participants. Overweight/obesity is closely linked to hypertension and cardiovascular diseases<sup>27,28</sup> and this connection is reported in several of the studies with high mean BMIs correlating to high blood pressure levels.<sup>23-26</sup> Cholesterol levels were significantly higher in U.S.-born Blacks than in African-born Blacks, for both males and females. An unhealthy diet, lack of physical activity, smoking and obesity were all behavioral risk factors associated with high cholesterol. A review of relevant literature shows a pattern of higher smoking rates and higher prevalence of overweight/obesity and although comparatively higher than among African-born Blacks, U.S.-born Blacks reported a relatively low prevalence of physical activity compared to the national sample.<sup>29</sup> Lastly, O'Connor et al<sup>23</sup> found that immigrant African-born Black men were less likely to have health insurance. They concluded that African-born Black men were therefore less likely to visit a primary care provider, and despite self-reporting as healthy, these factors further contribute to the higher prevalence of undiagnosed diabetes.

#### African Blacks Living Outside the U. S. vs. U. S. -Born Blacks

The studies comparing Black Africans remaining in their country

**Table 4.** Cross Sectional Studies on Hypertension and BMI of Males by Nativity—Outside vs U.S-born

Author	Country	N (%)	Mean Age±SD	sBP*±SD	dBp**±SD	BMI***±SD
Cooper et al <sup>31</sup>	Nigeria	1171 (25.5)	-	121.5±19.7	73.3±13.0	21.7±3.6
	Cameroon	1357 (29.6)	-	121.8±15.7	76.1±11.7	24.3±3.3
	Caribbean	1345 (29.4)	-	125.2±18.9	74.7±13.1	24.7±4.1
	United States	708 (15.5)	-	125.3±19.5	73.9±13.4	27.1±5.5
Okosun et al <sup>32</sup>	Nigeria	875 (39)	41.5±12.3	120±19.1	71.6±13.8	22.5±4.4
	Jamaica	510 (23)	46.8±14.2	122.3±21.3	70.0±15.1	23.8±4.2
	United States	844 (38)	45.9±14.1	126.4±8.8	78.4±12.0	26.5±5.0
Cooper et al <sup>33</sup>	Ghana	207 (18)	34.6±6.7	118.9±13.1	68.5±11.4	22.2±2.7
	South Africa	232 (20)	33.7±5.6	129±17.1	79.6±13.2	22.4±4.3
	Jamaica	249 (21)	34±5.9	121.5±12.8	71.2±11.1	23.6±4.5
	Seychelles	230 (20)	36.5±5.1	122.7±14.6	75.0±11.4	26.5±4.9
	United States	243 (21)	35.5±6.2	127.9±14.5	81.0±12.1	29.7±7.6

Notes: \*Systolic blood pressure; \*\*Diastolic blood pressure; \*\*\*Body mass index

**Table 5.** Cross Sectional Studies on Hypertension and BMI of Females by Nativity—Outside vs U.S-Born

Author	Country	N (%)	Mean Age±SD	sBP*±SD	dBp**±SD	BMI***±SD
Cooper et al <sup>31</sup>	Nigeria	1338 (25)	-	119.1±21.8	72.1±12.8	22.6±4.7
	Cameroon	1471 (27)	-	118.9±21.8	73±12.8	25.2±4.5
	Caribbean	1814 (33)	-	122.3±21.3	72.6±13.4	28.2±6.4
	United States	810 (15)	-	122.4±19.6	72.7±11.8	30.8±7.7
Okosun et al <sup>32</sup>	Nigeria	1056 (37.5)	40.0±11.3	116.5±20.5	69.5±14.0	22.9±5.2
	Jamaica	776 (27.5)	45.9±13.2	121.3±21.9	69.3±14.7	28.0±6.5
	United States	983 (35)	44.4±13.3	121.3±21.7	73.2±12.6	29.4±6.9
Cooper et al <sup>33</sup>	Ghana	293 (22)	34.0±6.6	110.5±15.2	66.2±11.48	25.5±5.2
	South Africa	268 (20)	33.1±6.0	118.2±18.6	76.3±11.8	31.9±8.2
	Jamaica	251 (19)	34.7±6.2	115.2±14.7	72.1±11.4	29.5±6.7
	Seychelles	270 (20)	35.8±6.0	110.8±12.8	71.2±9.9	27.6±6.2
	United States	257 (19)	35.0±6.3	117.5±16.1	79.6±13.2	34.1±8.8

Notes: \*Systolic blood pressure; \*\*Diastolic blood pressure; \*\*\*Body mass index

of origin and U.S.-born Blacks provide some interesting results. Richard Cooper was the primary author or co-author of all three studies that examined Black men and women in West Africa, East Africa, South Africa, the Caribbean, and the United States.<sup>30-32</sup> Due to insufficient reporting on some of the measurements, only the results from blood pressure and BMI measurements can be reported here. Systolic and diastolic blood pressure were measured as reported above. Height and weight in light clothing with no shoes and measured on a digital scale were used to calculate BMI.<sup>30-32</sup>

Tables 4 and 5 show the results by region of origin and sex. For African-born Black men, the mean age ranged from 34 to 47-years while for women, it ranged from 30 to 46-years. For men, sBP ranged from 118.9 to 127.9 mmHg while for women, it ranged from 110.5 to 122.6 mm Hg. For men, dBp ranged from 68.5 to 81 mm Hg while for women, it ranged from 66.2 to 79.6 mmHg. For men, BMI ranged from 21.7 to 29.7 kg/m<sup>2</sup> while women ranged from 22.6 to 34.1 kg/m<sup>2</sup>. The pooled analysis (Table 6) shows that

for both Black men and women, Africans residing in their country of origin were younger, less likely to have an elevated risk of hypertension, and less likely to be overweight and obese than their U.S.-born counterparts. Both African and U. S. -born men were more likely to have higher blood pressure rates than were the women, while the inverse was the case for BMI with both African and U. S. -born women being significantly more likely to be overweight or obese than their male counterparts. Overall, Africans residing outside the United States, both males and females, appear to be less likely to have elevated hypertension risk and were also less likely to be obese than African-born Blacks residing in the United States. However, they also tend to be younger and age is a known major risk factor to developing hypertension.

## LIMITATIONS

Sixty percent (60%) of the men in the study by Yu et al<sup>24</sup> and 50% of the men in the study by O'Connor et al<sup>23</sup> had been in the Uke-

**Table 6. Pooled Analysis on Hypertension and BMI by Sex and Nativity-Outside the U.S vs U.S -Born**

Region	N (%)	Mean Age $\pm$ SD <sup>†</sup>	sBP*	dBp**	BMI***
<b>Males</b>					
African Total - Average	4072 (51)	36.7 $\pm$ 7.4	122.3 $\pm$ 16.5	74 $\pm$ 12.4	23.3 $\pm$ 3.9
Caribbean Total - Average	2104 (26.4)	40.4 $\pm$ 10	123 $\pm$ 17.7	72 $\pm$ 13.1	24 $\pm$ 4.3
United States Total - Average	1795 (22.5)	40.7 $\pm$ 10	126.5 $\pm$ 14.3	77.8 $\pm$ 12.5	27.7 $\pm$ 6.0
<b>Females</b>					
African Total - Average	4642 (49)	35.7 $\pm$ 7.5	115.7 $\pm$ 18.4	71.4 $\pm$ 12.1	25.9 $\pm$ 5.6
Caribbean Total - Average	2841 (30)	40.3 $\pm$ 9.7	119.6 $\pm$ 19.3	71.3 $\pm$ 13.2	28.6 $\pm$ 6.5
United States Total - Average	2000 (21)	39.7 $\pm$ 9.8	120.4 $\pm$ 19.3	75.2 $\pm$ 12.5	31.4 $\pm$ 7.8

Notes: \*Systolic blood pressure; \*\*Diastolic blood pressure; \*\*\*Body mass index; † Cooper et al.<sup>30</sup> Mean Age $\pm$ SD not provided

gbu et al<sup>25</sup> study. As a result of the limited heterogeneity demonstrated by these three studies, it is hard to agree with the position that the healthy immigrant effect is no longer valid for Black African immigrants as posited by both Ukegbu et al.<sup>25</sup> and O'Connor et al.<sup>23</sup> In addition, all three studies<sup>23-25</sup> were conducted in Washington D.C., while the study by Hyman et al<sup>26</sup> was conducted in Houston. This lack of geographic diversity further limits the generalizability of these studies to the larger Black African population living in the United States.

All of the studies in this critical review were limited by their small sample size. Furthermore, Hyman et al<sup>26</sup> recruited only health professionals for their study, which implies a higher socioeconomic status that could further limit the generalizability of their results.

The studies comparing Black Africans living in their country of origin lacked information on cardiovascular health factors other than BMI and hypertension and thus did not allow for a complete health profile of African-born Blacks. Also, none of the papers identified for this review included information on access to health care or healthcare utilization. If information on these potential risk factors was available, it might have helped explain the observed differences in cardiovascular outcomes between U.S.-born and African-born Blacks.

Lastly, a simple pooled analysis may not be considered the gold standard for reporting aggregate data of studies as it might overlook potentially important subgroup characteristics.<sup>33</sup> However, research has shown that a pooled analysis has “the ability to improve the power of small or inconclusive studies to answer questions and the ability to identify sources of diversity across various types of studies.”<sup>34</sup>

## IMPLICATION OF FINDINGS FOR FUTURE RESEARCH

African-born Blacks who served as subjects in the reviewed studies had an average length of stay in the United States of 10-years. It is not unreasonable to posit that length of stay is a proxy for acculturation and that it may be a risk factor for hypertension, high cholesterol and diabetes among immigrants. However, Hyman et al<sup>26</sup> reports that being African-born was protective against hypertension, despite the fact that over 80% of subjects in that study lived in the U.S. for 10-years or more. Moreover, a 2020 study by

Ioannidis et al<sup>35</sup> showed no association between length of stay and cardiovascular health for the immigrant African Black. However, their study was unable to make a distinction about whether subjects of African descent identified as Afro-Caribbean, Hispanic or Latino.<sup>35</sup> These contradictions suggests that additional research is needed on environmental or lifestyle influences that impact cardiovascular health for various Black immigrant populations.

Okwuosa et al<sup>19</sup> suggested a genetic influence as the reason for the observed differences in cardiovascular diseases between African-born and U.S.-born Blacks. While genetic influences are beyond the scope of this review, future clinical studies should explore this hypothesis. In addition, future research should consider how social determinants of health put African-born Blacks residing in the United States at risk for CVD compared to U.S.-born Blacks.

All of the studies in this review suggest that waist circumference ratio or body fat, as well as visceral adiposity, were associated with the poor cardiovascular health of African groups rather than BMI. Other studies have also shown this association.<sup>31,36</sup> More research is needed in this area and, if found to be consistent, should generate calls for a change in guidelines for cardiovascular risk factors.

For all of the studies in this review, the majority of the African-born Blacks were from West Africa, particularly Nigeria. Meyer et al<sup>37</sup> report that Nigerians tend to be highly educated, more likely to speak English as their first language, and more likely to be employed than their fellow Black Africans and the general U. S. -population. This suggests that Nigerians have a different profile and perhaps some confounding protective or risk factors compared to their counterparts from other African nations. Studies have also suggested a lower prevalence of hypertension among Black West Africans, with one study reporting prevalence ranging from 15% in West Africa to 25% in East Africa, and between 42% and 54% in South Africa.<sup>30,31,38</sup> This review observed the same effect among Black Africans living in Africa but found West and East Africans living in the United States to have similar or slightly higher rates.

Like Gomez-Olive et al<sup>33</sup> Cooper et al<sup>9</sup> found significantly higher rates of hypertension among Black South Africans.

Research suggests that the social status of Black people living in a country where they are a minority, and where there is marked residential segregation and economic inequality, is a major risk factor for poor cardiovascular health.<sup>33,39-41</sup> There needs to be further research on the links between racial bias and discrimination with cardiovascular health among minority Black populations as Black immigrants will no doubt face these issues upon migration.

## CONCLUSION

Publications on the differences in cardiovascular health for African-born and U. S. -born Blacks in the United States are limited. This systematic review found only four papers that reported on a few cardiovascular risk factors, and all four had limitations that make them ungeneralizable to these populations as a whole. The secondary aim of this work was to identify studies where healthcare utilization was identified as a potential risk factor for the cardiovascular disparities observed between African-born and U. S. -born Blacks. Despite the fact that healthcare access and utilization have been found to be risk factors for poorer cardiovascular health for several populations in the United States,<sup>42-44</sup> none of the studies examined here evaluated these factors.

This review was unable to meet the two objectives, as the majority of the studies only reported BMI and hypertension rather than all seven cardiovascular health factors, and none examined healthcare utilization. Yet these results are an important contribution to the literature, indicating a very real need for future studies that can help close the gap in disparities between Blacks and Whites in the U.S. by understanding the diversity in the U.S. Black population. Spatz et al<sup>45</sup> found that the absence of a usual source of care, a healthcare utilization measure, was associated with being untreated for hypertension even among individuals with insurance. It is imperative that additional studies are conducted that examine the potential effect of healthcare utilization on the cardiovascular health of Blacks in the United States.

In a status report on hypertension in Africa, van de Vijver and colleagues<sup>46</sup> state that “urbanization and changes in individual and societal lifestyle such as an increase in tobacco use, excessive alcohol consumption, reduced physical activity and adoption of ‘Western’ diets that are high in salt, refined sugar and unhealthy fats and oils” contribute to steadily climbing hypertension and CVD rates in Africa. Considering this, there needs to be increased prevention efforts among the African-born immigrant populations in the United States, as well as early integration to the healthcare system to reduce the additional mortality burden which creates both a gap and economic burden on the American healthcare system.

## CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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